

Aviation News

McGRAW-HILL PUBLISHING COMPANY, INC.

DECEMBER 25, 1944



Biggest Bomber Refitted with Allison Engines: *First flight picture of the Douglas XB-19-A, huge flying laboratory of the Air Technical Service Command, Wright Field, now flying with 2600 hp. Allison engines and four-blade Curtiss 18 foot 2 inch diameter propellers. First flown as the B-19 in 1941, with smaller engines and propellers, the plane is still the largest known to be flying. It already has repaid its cost by providing the Army with data on big plane construction, ATSC spokesmen say.*

Harvard Analysis Stresses Reconversion Preparations

New study declares post-war developments will be seriously impeded unless industry and government make coordinated plans.....Page 7

CAB Northwest Opinions Point to Merger, Interchange

Decision makes airline fourth transcontinental carrier; PCA also gains entry into New York, but Pogue sees merger preferable.....Page 38

Purdue Maps Post-war Expansion as Aviation Center

New program stresses instruction in aeronautical engineering and in air transportation as well as personal aviation.....Page 15

Mustang Dives Presage Comfortable 450 mph. Airliner

Design characteristics of high speed fighters, engineered into air transports, assure smooth, fast operation with minimum discomfort.....Page 11

Sales Methods to be Vital Factors in Personal Market

Survey predicts that about 30 out of 55 manufacturers will produce satisfactory plane at cost low enough to be competitive.....Page 21

Analysts' Consensus Gives Airlines High Rating

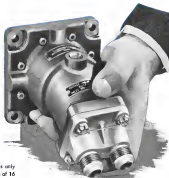
Aircraft manufacturing issues estimated at "average to below"; Bendix, Douglas, Lockheed, Sperry and United listed as favorites.....Page 36

2.5 HORSEPOWER PER POUND

IS THE OUTPUT OF THIS

VICKERS AIRCRAFT HYDRAULIC MOTOR

(PISTON TYPE
CONSTANT
DISPLACEMENT)



This Vickers Aircraft Hydraulic Motor weighs only 6.4 pounds yet it has a normal output rating of 16 horsepower at 3000 psi and 3750 rpm.

But a high horsepower/weight ratio is not the only advantage of using Vickers Hydraulic Motors for delivering rotary mechanical motion on many aircraft applications. These hydraulic motors save space as well as weight. Starting and stalled torque both closely approach operating torque. They can be stopped positively to position. . . . No clutches or brakes are required. They are used for dynamic braking and can be stalled for long periods without

damage. These hydraulic motors can be started and stopped instantly due to the very low inertia of the moving parts. They cause no radio interference. Restart and accurate control of speed are very simple and easily accomplished.

Vickers Aircraft Piston Type Hydraulic Motors are inherently simple and rugged; they are available in a wide variety of models for operating pressures up to 3000 psi.

VICKERS Incorporated • 1464 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Engineers and Builders of Oil Hydraulic Equipment Since 1921

THE AVIATION NEWS

Washington Observer

INDUSTRY'S FINANCIAL PROBLEM—The financial problems of the aircraft manufacturers are, in effect, the problems of all war contractors magnified to an extreme, as is clearly pointed out in the new Harvard Business School report discussed at length in this issue. The current campaign in Washington for increased production of critical war items, however, will even further complicate conversion problems because the leveling off process will tend to be eliminated in favor of full rate production. Thus, the impact of terminations and cutbacks may be considerably sharper.

MANPOWER REACTION—The current campaign to swing public opinion away from an early end to the war and to channel manpower into war undertakings may well be reflected in some fields that are scarcely related. It may slow down the return of planes to airlines, despite the fact that this had appeared promising through the middle of December. It may still be promising, but the new attitude is reflected throughout the Army and is influencing the thinking of virtually every officer. The planes might be available, but still not be released because of the possible effect on public thinking.

MANPOWER—Despite the statements of some Washington leaders on the manpower problem in connection with critical war items, one top leader has said that in the aircraft industry a "buge" saving of labor has been ef-

fective. Hence, he said, in the face of an overall decline in the number of workers, turnover and absenteeism in individual plants have been sharply reduced and labor productivity greatly increased.

CAA AIRPORT REPORT—Some Washington officials are complaining that recommendations listed in the CAA airport report, scheduled for next spring shortly in the Class 3 division for private flying and feedlines, are not making surveys of effective localities and submitting them for consideration. Sites for new airports, it is pointed out, have not been chosen by CAA, for fear of real estate booms. They are expecting recommendations to people locations.

LATIN AMERICAN AIRPORTS—Plans of United States airlines to use big planes on inter-American noncommercial air routes have increased interest among Latin-American diplomats in the availability of airports capable of handling these transport planes. Few such airports now exist in the other Americas.

AIRLINE INSURANCE—Washington sources expect early entry of at least two new groups in the field of insurance for airlines. Three groups have held control of the bulk of the hull, property and public liability market for many years, are given credit for their pioneering. But both government and airline circles feel it is time

New view of Fairchild's C-42 Packet to be built by Fairchild and North American for AAF



Turning on the Heat...

To Resist Heat Destruction!



Heat is the vital element with which Solar deals—the very reason for its being. Solar pioneered the present day airplane manifold...later developed heat exchangers, flame dampers, cowls, rat-plates and other accessories—all designed to control hot gases and resist destruction by heat.

The stainless steels used are selected for their heat and corrosion resistant qualities, formed by methods developed at Solar to minimize thinning, and annealed to prevent distortion from locked-in stresses.

In fourteen years of specializing on heat resistant products, Solar has acquired valuable knowledge which is at the disposal of other companies to help solve their problems in this field. Address "Management".



SOLAR AIRCRAFT COMPANY SAN DIEGO 12, CALIF. DES MOINES 5, IA.

VOLUME 2 • NUMBER 22

Aviation News
McGraw-Hill Publishing Co., Inc.

December 30, 1944

New Harvard Analysis Stresses Need of Reconversion Preparations

Study declares post-war developments and employment in aviation plants will be seriously impeded unless industry and government make coordinated plans for orderly and prompt conversion to peacetime production.

By SCOTT HERSEY

The economic and military importance of an orderly conversion of the aircraft industry is being increasingly recognized and a new study of the situation from the Harvard Business School points this up in an analysis which industry leaders generally believe penetrates to the crux of the problem and deserves widespread consideration both within the industry and without.

There probably is no group of manufacturers more in the spot-

light of discussion on post-war conversion and contract termination than the aircraft manufacturing industry. Post Tom Lilley and Isaacson L. La Verne Horton have gone into this thoroughly, using projected financial statements of leading airplane manufacturers for 1945 and 1946 and assume for purposes of the study that large-scale aircraft production will end by December, 1945.

Urge Conversion Preparations—
It is their opinion that post-war de-

velopment and employment in the aircraft industry will be seriously impeded unless industry and government make coordinated preparations for orderly and prompt conversion to peacetime output.

Leading aircraft executives have repeatedly urged programs which will meet the industry's first problem, that of survival, and the Harvard study comes to the conclusion that the average airplane manufacturer will be able to survive the immediate post-war adjustment period with a reasonably satisfactory financial position:

- ▶ If contract terminations are administered with a reasonable concurrence with the hoped policies as set forth in the Contract Termination Act of 1944;
- ▶ If the company sets up its own administrative organization to handle termination property, extending prior to the end of the war on effective inventory management;
- ▶ If the management curtails ex-



PLAN WEST'S AIR FUTURE:

Proposals which may become the backbone of California's post-war aviation program are coming from this committee. At this session, drafting reconversion plans for a state aircraft commission and its functions were: (Seated, left to right) A. Y. Prohle, business County board of supervisors; Dudley Steele, manager, Lockheed Air Terminal; E. W. F. Schmidt, C. A. A., Stockington; Lloyd Wright, chairman, Los Angeles, California State Reconstruction and Reemployment Commission; Robert F. Crap, commercial aviation department, University of Southern California; Dr. Baldwin M. Woods, University of California, Berkeley; Louis. Col. Bernard Rhine, California Wing Commander, Civil Air Patrol; (standing,

(left to right) Jack Charleson, assistant to the president, Western Air Lines; Howard G. Frost, California Railroad Commission, Col. William Corvill, CAA, South Region; Col. Clarence M. Young, Pan American Airways Station; A. Anderson, San Francisco Bay Area Aviation Committee; R. I. Hess, CAA, South Region; B. M. Doole, manager, San Francisco Municipal Airport; James G. Egan, vice-president, Southern Airways; Lee Goss, Transcontinental & Western Air, Inc.; Harvey Hancock, United Air Lines; William A. Hines, Young and Rubicam; A. L. Bone, American Airlines; William Fleet, Consolidated Vultee Aircraft Corp.; Perry H. Yell, San Francisco, Council of State Government; Thomas Wolfe, Western Air Lines.

passes realistically and rapidly. In this connection, the study comments that "probably the most important single difficulty of the conversion period will be the wastage of expenditures from wartime levels to drastically reduced peacetime levels."

"The magnitude of unreimbursed 'momentary' expenses which the average airplane company must absorb during the immediate post-war period will depend on three variables: (a) the ability or willingness of the company's management to absorb expenditures (b) the extent of advance action of contract terminations given by the government; (c) the extent to which post-termination expenses are reimbursed by the government."

Progress Reported—Industry leaders who have been concerned most directly with questions of terminations and conversion agree with the statement made in the report that the progress made during the last year in planning for contract terminations and conversion affords some grounds for optimism that these conditions may be fulfilled.

The study points out that the risk is great, however, that uncertainties and delays during the conversion period will unnecessarily require the extensive production of work required to produce maximum peacetime production. Lilley and Horton, studying this situation believe that confusion and unnecessary curtailment during conversion, make the suggestion that:

Uncertainties regarding contract

termination procedures can be reduced by a concerted effort on the part of industry and government organizations to pre-plan the methods, standards, and basis for making quick termination settlements well in advance of large-scale terminations.

Uncertainties regarding the loss carry-back provisions of the tax law can be reduced by adoption of a Treasury proposal to accelerate payments of loss carry-back refunds.

Uncertainties regarding future aircraft production and development can be reduced by making every effort to determine future national air-power policies in advance of the end of the war.

While the study concludes that industry and government are giving increasing attention to conversion, much of the detailed planning necessary for an orderly transition remains to be done.

The study also points to increased production of critical war materials and indications from some government and military leaders of shortages or approaching shortages in vital areas here, of course, not a danger on conversion in Washington and throughout the industry.

The Harvard study pointedly comments on a situation which is receiving serious consideration in the industry.

"Extremely apart from terminations and tax problems," it says, "the basic question facing every aircraft manufacturer in conversion is the extent to which the manufacturer will be vitally affected by the post-war aviation policies adopted by the government, including policies for Army-Navy procurement, plant and equipment disposal, surplus aircraft disposal and Civil Aeronautics Board certification of new transport routes."

Buyers Organize

An Aircraft Industry Buyers Group has been organized within the National Association of Purchasing Agents. The group is composed of purchasing officers of airplane manufacturers.

E. P. Scully, director of purchasing for Executive & Research Corp., Riverdale, Md., and a vice-president of the National Association of Purchasing Agents, will be chairman of the new group.

The buyers group at the first aviation unit in the N.A.P.A., according to members, although the purchasing agents of airlines have had

a committee organization within the framework of the Air Transport Association.

Rota Wings Designs New 8-Place 'Copter

Agnew E. Larson, president, expects to start production on all-metal twin engine craft within year.

Design details of a twin-engine, eight-place helicopter were outlined by Agnew E. Larson, aeronautical engineer and president of Rota Wings, Inc., during the Civil Aeronautics Board hearing at Boston.

Larson, who said he hoped to be able to start production of the first model within a year, described the helicopter as all-metal with two Jacobs L-400 engines of 300 hp mounted side-by-side close to the center of gravity.

56-Foot Rotor Diameter—The diameter of the three-bladed rotor would be 56 feet, Larson said, pointing out that "successfully down helicopters have not involved rotor diameters in excess of 40 feet," with indications that "the 56-foot rotor diameter represents engineering thinking which has virtually been perfected at the present time."

The landing gear is tricycle and retractable through a hydraulic system. The anti-torque propeller is three-bladed, with variable pitch and a 7 1/2-foot diameter.

The control system includes a single control of the main rotor and engine speed, with the main control a conventional type of cyclic lever transmitted by a control wheel. Foot pedals govern the pitch of the anti-torque propeller which provides directional control. Cost would be about \$27,000, without engine or radio.

Power Loading—Larson said a power loading of 35 to 19 pounds per horsepower would be possible as far as mechanical strength was concerned, but recommended 12 as best performance. He declared a climb of 1400 feet per minute would be possible, and that altitude could be maintained on one engine with a power output of 250 to 260 hp, achieving 55 mph. Engines are to be inclined backward at an angle of 5 degrees.

Larson declared that he is negotiating with two manufacturers who have expressed interest in the new design. He said that the four transport clients are considering subscribing.

Data on XB-19 Installations Aid Army's Big Plane Program

World's largest land aircraft, now known as XB-19-A because of extensive alterations, mounts four 2600 hp. Allison engines, each turning an 18 foot, two inch Curtis Electric propeller.

By ALEXANDER MCSURELY

Flight test data on experimental installations at the world's largest landplane, the one and only Douglas XB-19, now redesignated the XB-19-A because of extensive alterations, are proving a valuable addition to the AAF's store of knowledge about big airplanes.

Today at Wright Field, by experimental testing center of the Air Technical Service Command, the XB-19-A mounts four liquid-cooled Allison 3420 engines, in its wings, and each of the big supercharged engines, rated at 2600 hp, turns a four-blade 18 foot two inch Curtis Electric propeller.

Thus the big airplane is actually a flying test stand for the new liquid-cooled engines, and the propulsion, believed to be the largest in blade area to have been flown.

First Flight—Sketches sketched back on June 27, 1941 when Col. Stanley Usselman, then chief Wright Field test pilot, made the initial flight out at Santa Monica, Calif., from the Douglas plant to the March Field runway, 63 miles away. The plane was underpowered, they said, although it was equipped with four Wright engines then limited to 1500 hp, and turning three-bladed 17 foot propellers.

Actually the brand-new B-19 was already providing flight test

data in that and subsequent flights on performance of the 3420 Duplex Cyclones which later stepped up their horsepower rating to 2200 and powered the Boeing Superfortress B-29's.

In some ways the critics were right. The B-19's basic design dated back to 1935. It was an old plane before it flew. It had a top speed of about 200 mph, and cruised at around 180. Its service ceiling was only 22,000 feet, with the undersupercharged engines; and its best performance was at 12,000 feet.

Flight Data Collected—But Brig. Gen. Franklin G. Carroll, engineering division chief, and other Wright Field experts wanted to know the answers to a lot of flight test questions about big airplanes. The proof of the plane is in the flying. And the ponderous B-19, called by men who fly in her "the sweetest flying plane you ever saw," has answered a lot of those questions, and may answer a lot more.

Soon after the plane came to Wright Field, in January, 1942, to begin its testing program, the Army's flight engineers prepared a library of reports on the plane, a file which has been growing steadily ever since. The file has been

43 More Transports

Forty-three additional C-54's have been declared surplus by the Army and will be allocated to domestic and foreign airlines sometime this week. In addition, 12 Lockheed aircraft have been turned over for allocation, and four already have been assigned to National Airlines, one to the Chicago, Black Hills and Western and one to Yankee Skyline. Most of the latter are understood to be used in plant engine operations.

Domestic airlines will get more than half of the new allocations, which were being delayed last week until the Civil Aeronautics Board could complete its recommendations for distribution of a number of planes larger than anticipated. All will be assigned at one time, it is expected.

Meanwhile, the State Department is understood to be requesting applications from foreign airlines for planes badly needed in these countries.

Meanwhile, the State Department is understood to be requesting applications from foreign airlines for planes badly needed in these countries.

made available to American aircraft manufacturers of large planes, providing them with concrete facts about large plane performance with which to bolster or correct their theoretical design studies of future big planes.

Neither security nor space permits the detailing of the B-19 reports, but a few general conclusions drawn from the mass of facts may be listed.

Fabrication—Much was learned about the problems involved in putting the huge craft, which has



XB-19-A Warms Up Big Engines: Powerful Allison V-3420 engine, restricted to 2600 hp, and turning 18 foot 2 inch four-blade Curtis propellers, are the service testing on the XB-19-A, modification of the

Douglas B-19, still the largest surplus plane to be flying. MacClesie is regarded as so satisfactory that they are being used on another untested pilot, without material change.

2,500 Salable

Of originally 30,000 aircraft produced thus far declared surplus, only 2,500 would be classed as readily salable in civilian markets. Of these, more than 700 have been sold.

In all, 6,239 planes have been sold, 3,400 of these being Douglas "Fleet" Corp. planes bought early in the year from civilian owners. These were light trainers.

In the service-owned category, 2,139 were known planes of the light type. Seven hundred sections of these have been sold, leaving 1,419, of which more than 500 are Taylorcraft L-2's, 54 are Aeromacs L-4's, 78 Piper L-4's, and 124 Intels L-2's. One hundred eighty primary trainers have been sold.

be devoted to organizing chapters in each state. Memberships will be graduated in cost from \$500 for a charter member; \$100 for senior members; \$25 for sustaining members; \$25 for contributing members, and \$5 for regular members. It is hoped to obtain a minimum of 1,000,000 members in the last classification, although the activity at the moment is concentrated on obtaining charter member subscriptions.

Backers—In addition to Wilson and Dr. Brewster, the following participated in the League's organization: Capt. Eddie V. Ikenbush, Lt. Col. Larry Bell, president of Bell Aircraft Corp., Philip A. Carroll, of Shesman & Stirling, New York; Arthur G. Carter, Fort Worth, Tex., publisher; Gardner Cowles, publisher of the Des Moines Register & Tribune and Look Magazine; Ralph S. Darnay, vice-president and general manager of American Airlines; Donald Davis, former vice-chairman of the War Production Board; Donald W. Daugherty, president of Douglas Aircraft Co.; Clark Gable, M-G-M star who starred in the AAF's *Capt. Jack*; Joseph J. Jones, president of Case School of Aeronautics; Charles F. Kettering, vice-president of General Motors Corp.; Oliver L. Parks, president of Packard Aircraft Corp.; Frank P. Rowell, retiring president of the National Aircraft War Production Council and president of Cereso de Pasa Copper Corp.; Sumner Seagraves, retiring governor of Maine; William W. Sperry, World War I ace, civilian mail carrier and until recently on active duty with the AAF; and Theodore P. Wright, Civil Aeronautics Administrator.

Sperry Test Field

Sperry Gyroscope Co. has obtained an article of incorporation related to carry out field tests for the company's flight instruments as well as to provide facilities for sales demonstrations and flight training for certain specialized personnel.

MacArthur Field—Known as MacArthur Field, the project will provide three runways, each a mile long, and each so constructed that landing and take-off will be possible in both directions. At present, a single hangar, built of proportions sufficiently large to accommodate planes of all sizes, houses the fleet of Sperry test planes.

Two small, steel structures, located near the big hangar, are being used as ground laboratories.



Dr. Edgar Fuller

Dr. Fuller Awarded F. G. Brewer Trophy

Award of the Frank G. Brewer trophy to Dr. Edgar Fuller, assistant director of CAA aviation education program, as the person making the greatest contribution to the education of American youth in aviation in 1944, was made by Vice-President Henry Wallace at a dinner given by the Aero Club of Washington, local NAA affiliate, last week. The trophy was endowed a year ago by Brewer, a Birmingham, Ala., businessman, honoring his two sons serving in the armed forces overseas.

The dinner also gave recognition to four scholars, presenting them with a certificate recognizing his helicopter achievements, and to Col. Clair A. Peterson, and Lt. Col. Jack H. Carter. AAF pilots who held West-East transcontinental speed records established last fall with P-51 Mustang fighters.

William Brewster—Gilt Bobb Wilson, aviation editor of the New York Herald Tribune, and former NAA president, was principal speaker and Congressman Jeanne Randolph of Virginia was toastmaster for the dinner, which was attended by approximately 350 persons representing all branches of the industry and including many of the top government figures in aviation.

Eleven other persons and organizations were given honorary mentions for previous achievements in aviation education. The 1943 trophy was won by the CAA for its pre-flight, CPT and WTS programs.

Dr. George W. Lewis, director of research for the NACA, served

as chairman of the committee on awards. Dr. Fuller joined CAA in March 1943, and since that time has worked with each of the 48 states in developing aviation education in elementary and secondary schools and colleges. Previously he was a lecturer at the Harvard Graduate School of Education and was for seven years president of Gila Junior College in Arizona. He holds doctor's degrees from Harvard and the University of Chicago.

Convair Dividend

Common and preferred dividends payable February 15 and March 1 respectively were voted by Consolidated Vultee Aircraft Corp. directors in San Diego last week.

Fifty cents a share will go to common stockholders of record February 2 and 31%; cents per share to preferred stockholders of record February 15.

Recall Plans

The Army Air Forces, official circles have disclosed, are reviewing release of combat-type planes to surplus and already have recommended recall of B-24 Liberators for recall.

It will be used for training. Fifty-seven B-24s, built by Lockheed, had been turned over to the Surplus Property Board and had been inventoried as that it was possible to recall AAF to recall them for the training purpose.

A War Department spokesman disclosed that, because of the changing war situation, the AAF is reviewing the release to surplus. It said it was not anticipated that many more would be recalled, since the bulk of combat type planes in service are obsolete and war-wearied models.

Fifty-seven Liberators remain in the surplus classification. They also include B-24s, B-17 Flying Fortress, but their recall is not expected to be necessary. Other combat types in surplus that might conceivably be useful again are B-24, B-26, P-40 Thunderbolt, and Lockheed P-38 Lightning—approximately 600 B-24s, P-38s and B-26s.

The planes are being maintained by SWS so that they are in condition for recall in the event of serious changes in the war situation.

U. S. Forest Service Explains Need Of New Plane Type for Operations

Convicted that manufacture of ship comparable to Ford trimotor will have access to good market in their class of work; has pioneered in air field.

The United States Forest Service, pioneers in the use of aircraft for a variety of uses in connection with forest management, fire control and rangeland conservation. The type plane that an aircraft manufacturer will design and offer an airplane of the same general size and operating characteristics as the old Ford trimotor will find a ready and substantial market.

The Ford and the Stinson Traveler have been the two plane-most in use in Forest Service activities, and later types of higher performance planes are now substitutes for the work in the woodlands of the west.

Aerial System Built Up—The Forest Service, while experimenting with various methods of plane operation, and the use of aerial system around checker operators who work under contract. David Godwin, Forest Service equipment coordinator, believes that this system will be continued as long as possible because it has proved economical, but he also believes that the percentage of Forest Service planes in relation to checker planes will increase after the war because of new developments, operations, and because checker operators more and more are interested in other fields.

By itself, the Forest Service cannot economically use planes in quantities sufficient to meet the needs of manufacturers in development of a modern plane comparable to the Ford or Stinson. But it points to the 48 state Forest departments, the foreign Forest departments in South America and Canada, and to the mining, feeder line and other operations in the mountainous sections of this country. The need, in the eyes of the Forest Service, is for a medium capacity, moderate speed high-wing, high-visibility plane with large wing area and rugged construction able to take off and land in rough and small fields.

Monomane Favored—At the moment, the best of the newer type planes for Forest Service use is the Nordynor Monomane, of which one is being used in the Lake forest area of Minnesota. It is

equipped with floats. The Stinson L-3 Flying Jeep and the Fairchild Forwarder also have been found satisfactory within limitations. It now remains to be decided what type plane for reconnaissance work.

The Forest Service first began its work with airplanes in 1921, when Major (now General) H. H. Arnold commanded a group of 24 Forest Service planes under an operating agreement with the Army Air Corps to regularize fire detection patrols in the Pacific Coast area. This work continued during a period in which the Forest Service was building up its ground detection posts and communications system. It was found that the ground detection posts were more satisfactory because of their 24-hour, all-weather service and the Army patrols gradually were discontinued.

It was after this that the Forest Service began its policy of building up checker operations through the western country for their service and it was not until 1937 that the Service bought its first plane, a specially-built job. For three years, experiments were carried out with a group of six Forest Service planes, which were used to check the woods from the air. This work did not prove completely satisfactory, and is now being held in abeyance until further work can be done after the war.

At the same time, the Forest Service has been working with all types of bombs, impact-expanding types, time and various chemical types.

Helicopters—The Forest Service is hopeful that helicopters will be used as a means of fighting fires from the air, and, although it is little known, it was instrumental in respect of the first application, in 1938, for experiments with rotary-wing planes and has been following their development with great interest.

In 1939, the Forest Service began the first real development program in parachuting in this country as it is the only way to Russia and Germany has been active in this type of work. It experimented with the landing of men in rugged areas for fire fighting and rescue work, and since the

outbreak of training for Army, Coast Guard, and Canadian units, particularly for rescue work. Some of this story is only now being reported in the popular press. The Forest Service program itself is larger now than it has ever been, and an even greater expansion is possible after the war.

Carries Fire-Fighting Crews—As generally organized now, the Forest Service uses planes to take crews as close as possible to the scene of fire, and to bring supervisory personnel from other sections to reinforce those in the ground area. With more than 50 of its own fields throughout the western forest regions, it is often possible for the Service, using its own and charter planes, to save hours and days of travel and foot travel in reaching inaccessible fire areas. Supplies and other material can be flown in or dropped by parachute to fighting crews.

Charter contracts for past year have been sizable, but there is a feeling that eventually this system will have to be replaced by a Forest Service Air Force. However, the Service says it intends keeping charter operators in the service as long as possible—W. O. K.

AVIATION CALENDAR

Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.

Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.

Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.

Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.

Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.
Jan. 10—Aviation Academy, Reynolds Research, Inc., New York City.

CROSS-SECTION OF FIRST CALIFORNIA AVIATION CONFERENCE



Roll E. Hubbard, vice-president and chief engineer of Lockheed Aircraft Corp. (seated, wearing glasses), who predicted airline cruising speeds of more than 450 mph, and sold airport planners they'll not need runways longer than 5,575 feet. Introducing him is Edward V. Miller, San Francisco, chairman of the San Francisco Bay Area Aviation Committee.



James Quirk, North American Aviation, Inc., introduced as idea for "Tex" Raskin, head of Pacific Aeronautical Academy, Tulsa, Oklahoma, for the Aeronautical Training Society, Raskin told the conference that the Federal Government should make funds available for the post-war training of "every American boy who wants to fly."

John R. West, Los Angeles, California aviator, National Aeronautic Association, who demands uniformity of aviation taxes, sat next to Glen Eastburn, NAA vice-president and head of the Los Angeles Chamber of Commerce transportation committee. Raskin, who organized the conference, also elected permanent chairman.

Heavy Trainers Top Surplus Plane List

Combat aircraft in service decadal lists are usually obsolete types and experimental models.

More than half of service surplus declarations of planes are heavy trainers in various categories, the bulk of which will be stored for future use. For the most part, combat types declared surplus are obsolete types and experimental models. There are 111 utility cargo planes remaining inside of 121 lists for declared surplus. These UC planes are in the light class that can be sold without objection, and should be available to interested purchasers.

More than 400 light planes of the liaison type remain in surplus the bulk of them Taylorcraft, Aerocraft and Interstate types. Offering of these planes for bids chiefly has been in the western states, although some additional are expected to be offered in the east, mid-west and south.

Types—The combat types declared the types that the Army has been clearing from its books. Seven are Republic P-15s, an early four-engine of the P-47, but powered only with a 900 hp. engine and with a top speed of 320 mph. Twenty-seven are Republic P-48 trainers, an early step in the development of the P-47. Fifty-four early P-47s, war weary, are on the list. Fifteen are Curtiss P-36 Mustangs. Six hundred ninety are Bell P-39 Airacobras, an early obsolete. Eighty-seven are early series P-40s. Four are North American P-64s. Others are largely experimental planes, of which only a few were built.

Single engine bombers are generally obsolete types, although there are several hundred each of Douglas A-24s, Army versions of the Navy BH3, and Curtiss A-19s. In the two engine bomber category are quantities of ships like the Douglas XBT forerunner of the Boston, Martin B-26, Douglas B-19s and B-32s, early clipped wing versions of the B-24, and Vought Ventura. The B-13 was a heavy B-11s and B-32 Consolidated B-24s.

Light Transports—The bulk of two-engine light transports in surplus consists of Cessna UC-78s—421—of which some has been sold because of Civil Aeronautics Administration certification requirements.

PRIVATE FLYING

Purdue Maps Post-War Expansion As Aviation Education Center

New program stresses instruction in aeronautical engineering and in air transportation as well as personal aviation; leads to B.S. and M.S. degrees.

By ALEXANDER M. SURELY

Development of an enlarged aviation education center at Purdue University, Lafayette, Ind., emphasizing instruction in the fields of aeronautical engineering and air transportation, but not overlooking personal aviation, is a major post-war project of the state-owned school which has long pioneered in aviation training and has operated its own airport since the early 1920s.

Currently sponsored by Purdue Aeronautical Corp., a non-profit organization affiliated with the university, the airport is being used to train pilots from eight Latin American countries in airline and fixed-base operations, under leadership of Grace Webster, former head of the CPT program, now general manager of the corporation. In February, 1948, the CPT program was initiated at the Purdue airport, and by June, 1948, more than 500 students had been graduated from flight-training programs. Since that time, the corporation has graduated 31 Army pilots, 334 Navy V-8 pilots, 166 Navy flight instructors, and 34 pilots in the Inter-American pilot training course.

Main Expansion Projects—Major units in expansion of the school's aviation equipment physically, will be a large engineering building attached to the present aircraft shops and power plant laboratory, an airport terminal building, and a number of hangars of various types for private planes, and a four-runway layout of 4,990 feet concrete runways, two being 200 feet wide and two being 150 feet wide each, connected by taxiways. Currently, the airport of 360 acres has a completed NW-SW runway 3,900 feet long, and a portion of its NW-SE runway completed. The land was provided in 1930 by a gift of a large portion of it from David Ross, president of the board of trustees, with a recommendation that it and

an adjoining University-owned farm be set aside for development as a university airport.

Besides its airport facilities the university conducts much of its aviation work in the aeronautical building on the main campus, where the aerodynamics, propeller, aircraft instrument and airplane structures laboratories are located. The new engineering building will provide a main lecture room for the aviation center, a flight test and instrumentation laboratory, facilities for airplane drafting and product design, and more space and equipment for aerodynamics, air test, dynamic test, physical test, vibration, plastics, high altitude research, cold chamber research and super-sonic speed wind tunnel.

Curriculum—Post-war plans call

for an aeronautical engineering course leading to a bachelor of science degree in aeronautical engineering, and a post-graduate course leading to an M.S. degree, specializing in aerodynamics, structures or powerplants, and an air transportation course, with optional specialization in operations and maintenance, or flight administration. The operations and maintenance course as well as the engineering course, call for summer terms of ship training. Flight instruction is recommended as an elective for the aeronautical engineering course, and as required for the operations and maintenance and flight administration courses.

Included in flight administration courses are such subjects as airway communications, weather forecasting, airline and fixed base operations, control tower operation, aviation law, besides electronics and a grounding in fundamentals of aeronautical engineering. At completion of flight administration, curriculum students will be qualified to receive a commercial pilot's certificate with instructor and instrument ratings, as well as their degree of Bachelor of Science in Flight Administration. The course is so planned that a student will not have to choose between flight administration and engineering until the beginning of his third year, and if he selects engineering, he does not have to choose one of the three special options until the be-



Purdue Airport Seen From Air: Present runways at Purdue University airport will be replaced by an expanded runway system with four runways, NW-SW and NW-SE 200 feet wide each and 4,990 feet long, and N-E and E-W 150 feet wide and 4,990 feet long, and connected by paved taxi strips, as seen on post-war conditions permit. Plans also call for a new modern terminal building, a large engineering building, and a group of small hangars for private planes.

granting of the sixth term or mid-point of his junior year.

In addition to the four-year courses, Purdue is planning to offer a short summer course, beginning next summer, for high school teachers, preparing them to teach high school aviation courses.

Plane Sales Firm Takes Cars in Trade

Aviation Center of Pittsburgh, a recently opened sales agency for personal planes, is taking automobiles in trade for airplanes. In its showroom, the organization displays a small monoplane, with an auto parked under one wing, as indication of the trade-in plan. The

company approaches used cars offered as trade-ins, and later resells them through retail and wholesale channels, but emphasizes that its main business is selling airplanes, not cars.

Missed Response Reported—Guy M. Miller, veteran airport operator in the Pittsburgh area, who heads the center, reports that response has been good to "Planes for Sale" classified advertising in Pittsburgh newspapers, and in trade publications, with inquiries coming in from many parts of the country.

Planes sold are necessarily used planes, since new ones are not now available, but all have been overhauled and relicensed with no time on them since relicensing.

Marjorie Debie, office manager, is a qualified ground school in-

structor and a flyer. The center plans a complete service of selling planes, training the buyers to fly, and selling them plane accessories later. Second and third years of the Center are used for stocking parts and accessories.

Plane Parts Trade Expansion Predicted

New head of Aviation Distributors and Manufacturers forecasts possible 2,000 percent gain within 10 years after war.

Expansion of aircraft replacement parts and servicing which may reach twenty times its present size within 10 years after the war is predicted by Tom O. Duggan, newly elected president of the Aviation Distributors and Manufacturers Association, providing the development of personal aviation is not seriously handicapped by excessive government regulation.

Duggan, who is also vice-president of Thompson Products, Inc., was a test pilot at Langley Field, Va., during the First World War, and has worked at various times as a shop man, auto race driver, carburetor engineer, automobile manufacturing superintendent, and replacement parts distributor, before joining Thompson in 1931.

Part Program—He bases his prediction on the proposed federal-state airport development program, wartime progress with aircraft materials, engineering and production methods and improved plane and engine designs, and the effect of the return of 2,500,000 unarmored young men from the armed forces after the war.

Estimating the military plane sales after the war, Duggan estimates that two-thirds of the aviation industry's post-war volume will be in maintenance, service and supplies.

Cites Airport Need

William A. Mara, veteran personal aircraft specialist, believes America will require at least 15,000 airports for an adequate development of post-war private flying. Expressing his views at a recent NAA forum in Cleveland, Mara, a staff executive of Bendix Aviation Corp., in charge of that organization's developments relating to personal aircraft, said any American should have the right to obtain a pilot's license with no



Western Nets \$120 More a Year With Every Pound Saved



SAYS
THOMAS WOLFE
V. P. of Traffic
& Advertising
Western Air Lines, Inc.



Purdue Students Use Wind Tunnel. Above: smaller of two wind tunnels at Purdue University's aerodynamics laboratory is a quiet, incompressible free-flight tunnel used for classroom demonstration. Below: other students set up plywood fuselage for static test.



"A pound on the ground at the right time and place is worth its weight in gold in the air. Reduced to an economic equation, a useless airplane pound turned into a productive pound today means \$120 annually to Western Air Lines. Tomorrow it may mean more as air transportation technique improves. The consumer is the ultimate beneficiary of this constant battle of the airplane to deliver the maximum weight in the minimum of time."

Boots Nets Save Up to 60 Lbs. Per Plane

- Tougher, safer, lighter . . . and all steel!
- Vibration-proof. Won't shake loose no matter how many times re-used.
- "Deadend" the plane!
- Meets specifications of every government aviation agency.
- Every type of military aircraft equipped with the Boots Net.
- Standard fastenings, or converted places in post-war commerce.

Master Picture—"All Work and No Play"—it was saved—30 minutes. Write for literature.

BOOTS SELF-LOCKING NETS

"They Fly With Their Own Coils—Lighter"

Boots Aircraft Net Corporation, General Office, New Canaan, Conn., Dept. L

Representatives in New York • Chicago • Detroit • Indianapolis • Los Angeles • Kansas City • Dallas • Toronto • Montreal • Vancouver

BOOTS STEEL ANCHOR NET

(Pat. #2,122) The anchor-type net is 100% shockproof, fire resistant, and self-closing.



Send for Free Weight-Saving Booklet. Actual weights of over 250 lbs. forest old locking nets used in aircraft, comparatively reviewed for the convenience of aircraft designers, engineers, operating and maintenance personnel. Copy will be sent you, free, on request.

greater relative difficulty than an automobile driver's license.

He voted again the widespread complaint of personal aviation against stringency of current federal regulations on pilots, and declared it was the responsibility of manufacturers to bring about safety through design and production practices to the utmost of future advancement of aviation.

Ease Civil Flight Training on W. Coast

Fourth Air Force to announce easing of relaxation of rules about Jan. 15.

Fourth Air Force on or about Jan. 15 will announce conditions under which civil flight training will be allowed up and down the West Coast.

The terms probably will not be all that civilian flight schools and personal aircraft owners desire, but are a notable concession to civil aviation enterprises that have been grounded since Pearl Harbor.

School operators should not look for any readjustment of the Western Defense Zone boundary which extends approximately 150 miles inland from the Coast and establishes the area in which only military, airline, and "war effort" civil flights now are permitted. Neither Fourth Air nor Western Defense Command will be willing to budge the boundary.

Prohibited Areas—Thus, the only and still unannounced alternative will be the drawing of circles around prohibited areas within the zone and the announcement that civil school operations will be permitted in all areas outside the circles.

This assumption is supported by an announcement in San Francisco by Maj. Gen. Henry C. Foy, temporarily relieving Maj. Gen. Charles H. Boesman as commanding officer of the Western Defense Command.

He said limited flight training will be permitted at such sites and within such areas as are approved by the inter-departmental air traffic control board, the sites to be in locations that will not affect adversely the air defense of the Pacific Coast, interfere with military operations, or jeopardize military security.

Hook Leads Fight—El A. Hook, regional manager south region, security and administration, should be credited with a leading role in influencing a relaxation of

western civilian flying restrictions. In a recent trip to Washington, D. C., and at numerous conferences with military authorities at San Francisco he has pleaded the cause of civilian flying.

It was in the fear that all the work by Hook might be jeopardized that Harold Bromley, Chief, General Inspection Branch, CAA, South Region, recently cracked down on a group of Southern California airport operators and ordered them to halt unauthorized student flight instruction.

Personal aircraft owners hope that the Army soon will relax the ruling that their West Coast point-to-point flights can be authorized only if they can establish that the flights are in connection with the war effort, such as the flight of a Los Angeles plane owner to San Francisco on business with a war industry office on the northern city. They would like to see the "war effort" requirement relaxed to a designation of flights "in public interest."

—R. B.

Briefing

For Private Flyers and Non-Scheduled Aviation.

A recent statement of a well-known government official that there are only about a dozen colleges in the country operating their own airports with flight training programs, is regarded as an extremely low estimate. One state, Tennessee, alone, has five colleges which own their own airports and 18 others that lease airports for their operations. Another estimate is that there are at least 26 colleges owning or in process of acquiring their own airports, besides others operating flight training programs in conjunction with local airports.

New Opportunity—While the college operator may take some flight training away from other nearby fixed base operators, they offer at the same time an opportunity for additional employment of instructors, operators and mechanics, and in a number of cases provide good landing facilities for communities which otherwise might not have them.

Natural Tieup—The airport operator at the vicinity of a college which has not yet taken up flight training probably would gain more by selling the college an establishment of a flight training program at his airport, than by attempting to buck the college program, as some

are expected to do. Then if the college wants its own part later, he is in a natural position to move in as manager of it, still continuing his own operations, as several operators already have done. Even if he does not succeed in getting the college contract, he still stands to benefit indirectly from the increasing number of pilots and planes that the college program will bring into his local area. Whether these benefits will offset the disadvantage of competing with a well-endowed private, church state-operated college for flight students is something else.

More Examiners—Steps to alleviate the old complaint of the pilot about the insufficient number of approved medical examiners are reported under way. Announcement of appointment of additional examiners is expected soon from CAA. Pilots have complained bitterly for years about having to travel 50 to 100 miles from home to find a CAA-approved medical examiner and then sit around with a doctor either pilot for long hours of waiting for the privilege of being examined. The expected relief for this situation can't come any too soon. Eventually, many personal aviation foreclosures expect, the CAA will permit the medical examination for private pilots to be conducted by any competent physician. But this is still a long way off.

Special Regulation for Parks—A special Civil Air Regulation adopted recently by the CAA provides that every person listed by Paries Air College as a trainee in an experimental flight training course may be authorized to solo while holding a medical certificate, without other aerial certification. Permission is given only for one solo, after which it is assumed the student will provide birth certificate and fulfill other requirements when he continues flight training. The regulation was enacted for a limited time, from Dec. 8 to Jan. 15.

Public Relations Course—The young but outspoken United Pilots and Mechanics Association, in its latest news letter reports: "A change is coming in General Inspection (of CAA). . . The latest information is that the CAA is going to give its inspectors a course in courtesy and public relations." Removal of an overbearing old dog alone will help a lot, too."

—A. McS.

Phillips
great wartime record
in the production of
100-octane gasoline
verifies
our peacetime research
and foretells
finer postwar fuels

Phillips
AVIATION GASOLINE

BENDIX EXPRESSOR AMPLIFIER

Maintains selected threshold level Attenuates background noise



Designed to fit standard 19-inch relay racks, this unique amplifier occupies only 3 1/2 inches of panel space providing definite advantages—for it uses in one compact unit both an expander and a compressor.

In fact the name "expressor" has been coined by Bendix to denote the combination of these features—a system which effectively solves two major problems of communications equipment operation from noisy control panels.

The compressor so sharply limits gain beyond a selected threshold level that a 20 db increase in

input level above threshold selected results in no more than a 1.5 db increase in output level.

The expander effectively minimizes background noise and other undesirable interference with resolution is supplied. The amount of expansion and the levels at which expansion and compression become effective are adjustable by screw driver stops in the panel.

An outstanding example of Bendix Radio Circuit Engineering, this development is available in all sizes of communications equipment.

For complete details write direct to the Sales Department.

MODEL IS A TYPICAL ONE OF THE MANY AVIATION COMMUNICATIONS

Bendix RADIO DIVISION

BENDIX AVIATION CORPORATION, BALTIMORE 4, MARYLAND

STANDARD FOR THE AVIATION INDUSTRY

Sales Methods to be Vital Factors In Personal Plane Market Fight

Survey by Harvard aviation research director predicts that about 30 out of 55 manufacturers will produce satisfactory plane at cost low enough to be competitive; sees only few of these operating at profitable volume in early post-war years.

Of approximately 55 manufacturers who have indicated intention to enter the post-war personal plane market, Lynn L. Bellinger, Harvard University aviation research director, expects approximately 30 to produce satisfactory planes at a cost sufficiently low to be competitive but warns that only a few of the 30 will be able to attain a profitable volume in the early post-war years.

Being his conclusions on a personal survey which included visits and off-record discussions at most of the prospective personal plane manufacturers' plants, Bellinger emphasizes that the only companies that have "a fair chance of succeeding" are those who combine progressive design with effective merchandising. He anticipates a high mortality rate, among personal plane builders, comparable to that among early automobile companies. A large proportion of failures will be due to poor merchandising, while other companies will drop out because of inadequate design.

Merchandising Factor—Companies concentrating on engineering and production to the exclusion of sound merchandising plans are making a serious mistake, he warns, for often progressiveness in styling and merchandising may outweigh the mechanical advantages of a competing plane, and lower production cost, too, may result more from sales volume than from engineering innovations.

Errors in Timing—Designing planes too far in the future will probably cause more failures than adhering to obsolete designs, but Bellinger expects "errors in timing" of designs to eliminate about 10 of the 30 companies, leaving a total of 20 with salable planes. He emphasizes the importance of proven features, particularly in the first five post-war years. Untried innovations no matter how promising, face time-consuming factors of obtaining CAA approval, and of convincing dealers and public that the new features are safe and practical. By the

time these are conquered, other companies will have copied the innovations with small net gains to the originator.

The Harvard researcher presented his views in a recent paper before the American Marketing Association in Chicago. Other salient points of his personal plane market survey were:

- Designers must present improved and progressive models, and must continue research on future planes, but the successful company must have a model improved and distinctive but adhering to conventional and accepted design ready

for sale at the end of the war, to take advantage of the immediate market.

- Utahly flying eventually will dwarf sport or pleasure flying, but personal aircraft can't be sold immediately after the war on a basis of low-cost transportation to any large customer group. Suggested is an interim design to meet the immediate post-war market, with emphasis on sport and pleasure flying.

- Most companies indicate immediate emphasis on a two-seater line, one easy to fly, the other a sporty retractable landing gear plane with higher performance, both two-passenger types. Many manufacturers have "a four-place prototype in the back room which they hope to sell some day." A few three-passenger designs are being prepared.

- Exception to general rule is the short, relatively small, for planes which will carry four or more passengers, cruise at 150

Requirements for Personal Plane Selling

Listing of requirements for effective selling of personal planes "at least for a number of years after the war" as listed by Lynn L. Bellinger.

- Reskillized salesmen with technical aviation knowledge are required over airplane-suitable salesman.

- Airports will continue to be the main sales location, with demonstration flights and flight instruction before and after purchase useful sales techniques.

- Supplemental activities to help carry overhead will be necessary except for few dealers in areas with unusually high sales potential. Among activities: flight instruction, repair, storage, aircraft rental, charter service, other functions of fixed-base operator. There may be tendency for these to interfere with major business of aggressive sales program.

- Efforts of dealers to compete out of their own immediate sales area will be unprofitable. There will be more plans to sell than good dealers, resulting in a strong bargaining position for the few good dealers in each area. Some dealers may demand and get larger territories than they can service effectively, in an effort to support their sales program.

- Real estate will be extensive cost or inadequate sales coverage.

- Major workplace builders are most vulnerable to post-war failure in merchandising because of their concentration on technical five-seater or operational differences in previous sales to government or airline technical experts, and a resulting tendency to neglect important aspects of distribution and marketing techniques for popular volume sales.

- Expansion of private plane builders are placed; major emphasis on distribution. Should the helicopter, roadable plane or other developmental substitutes, in expanding personal aviation markets, companies with superior sales organization would have invaluable asset in succeeding period.

- Major determinant of which few companies succeed in attaining personal aviation markets, is found in the measure of trust to which merchandising responsibility is assigned, and in the answer to the question of whether they are able to start work soon enough.

- To solve his own sales problem, the manufacturer must solve his dealer's problem. More intensive explanation of each effective sales area, perhaps through development of substantial sales volume in associated products appealing to air-minded individuals visiting the dealer's airport, is suggested.

high or more, equipped for instrument flight, selling at \$5,000 or more. This market is restricted to large corporations or wealthy individuals, who probably will use professional pilots, and sales should be handled more like factory equipment sales than like ordinary sales to the public.

► Personal plane builders are confronted with the dilemma of choosing between inadequate market coverage or high sales costs. ► Historical research shows that as early as 1915, the Aero Club of America was calling for a chain of landing fields across the continent. In 1928 sales of 10,000 to 20,000 planes were predicted for 1933. Total number of private planes remained "surprisingly stable" from 1929 to 1939, until government-sponsored GPF program began. Analysis of new manufacturers' 1952 sales shows 45 per cent of his two-place lightplanes were purchased by third base operators, less than 20 percent by "domestic personal owners."

► Principal factors favoring large post-war increase in number of planes are increased number of landing facilities, and increased number of persons accepting flying as a normal part of their own activity. ► Post-war personal planes will

remain in the class of an expensive luxury with appreciable demand. Good prospective customers are limited to a group that can afford to spend \$1,000 a year on a time-consuming hobby. Complications of weather and navigation are yet to be overcome. Despite the present approved single-flyer plane, the soloed air flier for the general public appears many years away.

► For every individual who can afford his own plane there will be scores who will want to fly and can do so only in rented planes. This means fixed base operators will continue to be important customers as well as sales outlets.

► Merchandisers appealing to pleasure and sport motives of plane buyers in years immediately ahead may be far more realistic and successful than those leaning appeal on utility and practical transportation. On points of increasing, comfort, safety, economy, in competition with auto, railroad and airliner, today's private plane is not likely to compete.

Urges CAR Revision

National Aeronautic Association's campaign for drastic simplification of private pilot regulations was carried from Washington to

the California Aviation Conference by Lowell Swenson, NAA member.

He protested against the requirement that a personal airplane owner learn "31 pages of closely written regulations" (CAR) to win a pilot's certificate.

Delegate airplane owners, however, indicated satisfaction with present steps being taken by the CAA and CAR to simplify personal aircraft ownership and operation while still maintaining essential safety restrictions.

ATS Asks Nationwide Flight Training Plan

An appeal for a strong national policy to provide federal sponsorship of post-war flight training for "every American boy who wants to fly" was made before the California Aviation Conference by the Aeronautical Training Society, represented by Tex Rankin, head of Rankin Aeronautical Academy at Tulare, Calif.

Rankin cited the wartime training of military pilots by ATS schools as indicative of methods that might be applied to peacetime instruction to give the nation a trained nucleus for any air force that might be needed in a future emergency.

► Data—ATS mass training was accomplished with only one fatality per 63,336 hours of primary flight training, Rankin said. He added that California ATS schools have trained 25,990 cadets in training flights covering 425,000, 264 miles.

Small Fields May Replace Superports

Small 100-acre airports costing not more than \$250,000 each may replace obsolete the planning of vast multi-million dollar metropolitan airports.

The belief was given first public expression by Edgar N. Smith, CAA urban planning consultant at the California Aviation Conference in Hollywood last week. He estimated that three years after the war the potential of personal aircraft ownership will be 266 planes per 100,000 population and proposed that cities consider the building of comparatively inexpensive 100-acre airports according to their needs and located to serve segments of their population,



TODAY'S TAYLORCRAFT is easy to fly... any pilot knows that. But will you see the new 'Craft of tomorrow.

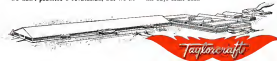
We've set our sights on a plane that will be still easier to fly... a faster, more luxurious ship with built-in stability... a plane that will give you more flying satisfaction every rule of the way.

We don't promise a revolution, but we do

promise a far finer plane than the fine ones we've built in the past.

We do promise a 'Craft that will be priced low enough to be easily within reach of the flying public... a plane which costs less to buy and less to operate.

Keep your eye on Taylorcraft. "The ship with the built-in subwing" will be out in front when the boys come back.



TAYLORCRAFT AVIATION CORPORATION · ALLIANCE, OHIO



ZIP OR ZAM IN PLANE OR CAR:

Wesley P. Zam, whose recent Saturday Evening Post story about the difficulties of personal plane flying caused more than considerable stir in the aviation industry, made a personal visit to the ADMA-NATA meeting in St. Louis recently, to be greeted by a parody of his story, as distributed by Aeronaut Aircraft Corp. The parody parallels the original almost line for line and illustrates, for illustration, but recounts the troubles of a long auto trip in the early days of the motor car. Moral: Don't sell personal aviation short. Remember automobiles had their troubles too in their early days. First pages of the Post original and the Aeronaut parody are reproduced above.



On To New Horizons

The development and production of this superior lubricating oil for aircraft engines was one of Mid-Continent's contributions to war-born needs. Today, huge quantities are being supplied to the Air Forces of the United Nations all over the world but a constantly increasing supply is or soon will be available for commercial and privately owned aircraft. Inquiries are invited.

MID-CONTINENT PETROLEUM CORPORATION

TULSA, OKLAHOMA

THE AIR WAR

COMMENTARY

Marines Expanding Air Arm For Support of Ground Forces

System found vastly more effective through setting up of air liaison teams operating between troops, aircraft carriers and fighters and bombers in operation by means of VHF radio.

Primary mission of the Flying Leathernecks is to provide direct air support for the Marine Corps ground forces in all types of operation. Hitherto Marine Aviation has been almost wholly shore-based, but now Marine air units are undergoing training to operate from their own carriers with slightly redesigned Corsairs.

As carriers became available, they will be able to fly from them in close support of Marine landing forces. From lessons learned in past operations, such close air support is now vastly more effective by setting up air liaison teams between ground units, aircraft carriers, and fighters and bombers actually in the air, by means of VHF radio.

Marine Aviation Expanding—As in the case of the Army Air Forces and Naval Aviation generally, the Marine Air Arm has expanded more rapidly than the Marine Corps as a whole. According to the original program the Marines were to have two air wings, each to be attached to a Marine division, with each wing divided into five air groups of several squadrons each.

Passing into the fourth year of the Pacific War, there are now three expanded Marine aircraft wings, two in the Central and one in the Southwest Pacific, and two operational training wings, one in North Carolina and one in California. The Third Wing, organized at Cherry Point, N. C., in November, 1943, is one of these, and has grown from a small group of fighters to a Wing of 8 Groups (3 fighter, 2 fighter, one medium bomber, one night fighter, one utility and one air warning group), and includes a larger number of personnel than the entire Marine Corps possessed a few years ago.

Early Pacific Engagements—By their gallant, hapless defense of Wake Island, Marine flyers of Fighting Squadron 211 have become immortal in the memory of America. In the decisive battle of Midway, Marine Corps dive bombers and torpedo planes (SB2C's and TBF's) attacked the enemy carriers and battleships in the face of heavy odds, scoring several hits, while badly outnumbered Marine fighter pilots, aided by anti-aircraft batteries set down some 40 planes of a large group of enemy carrier-based planes attacking shore installations on Midway Island.

Then came Guadalcanal, and out of that inferno of the South Pacific have come many of the Marine ace—fighter pilots Major Joe Foss, Major John Smith, and dive-bombing heroes, Lieutenant Richard Mangrum and Major Elmer Grier, who has expanded more rapidly than the Marine Corps as a whole. According to the original program the Marines were to have two air wings, each to be attached to a Marine division, with each wing divided into five air groups of several squadrons each.

During these hectic months, from beach-head Henderson Field, all aviation units, Army-Navy-Marines, were commanded by Major Gen. Roy S. Geiger, USMACV. This war's first example of "unified command" also achieved a remarkable success at Guadalcanal: Major Gen. (now Lt. Col.) Gen. Vandegrift commanded a Navy task force (Navy air, surface, under-surface, Marine units), which was shortly joined by Marine Air, then Army Air, and finally Army ground. It was an All-American combat team, and as flexible as any.

Solonowosky—By February, 1943, Guadalcanal had been cleared of the enemy, and Marine pilots in newly-arrived Corsairs, Dauntless dive-bombers, Avengers torpedo bombers and Gracys (B-24's) medium bombers began seeking targets further afield, and the great clutch up the ladder of the Solonowosky began. The Russell Islands were occupied on Febru-

ary 20 and fighter and bomber runways were laid out, with Marshalls, New Georgia the immediate objective. The tempo was stepped up in March, and the First Marine Aircraft Wing was supplemented by the advent of the Second.

All Marine aviation was under the command of Major Gen. Ralph Mitchell, USMC, who also took his turn with Major Gen. Nathan Twining (13th Army Air Force) and other commanders, in a rotating three-months' command of all land-based aviation in the South Pacific.

Marshall's defense fell on Aug. 5 and it was rapidly converted into a huge air base under Major Gen. Francis M. Bailey, USMC, commander of the New Georgia Air Force. Kahl, Bougainville and other enemy bases then began to feel the sting of Marine planes, while periodically, after the capture of Bougainville, the important Jap base at Rabaul, New Britain, received a steady pounding from the Marines and heavy blows from General Kenner's 5th Air Force Mitchell and Liberators based in New Guinea.

Gilberts and Marshalls—Landings followed at Vella Lavella, Bougainville, then bloody Tarawa in the Gilberts, further north New Britain and the Admiralties were secured, and then the dazzling steel victory of Kwajalein in the Marshalls. Among the Marine Corsair units flying from Bougainville was "The Black Sheep" Squadron, led by the late Major Gregory ("Poppy") Morington, who shot down his 28th Jap plane over Rabaul, tying the record of Major Joe Foss, and then disappeared.

It was from Bougainville that Marines in two PB4T's (Navy Liberators) damaged two over the divided Jap military base of Truk, and large quantities of Jap warships, including two carriers. This led to the great two-day assault on Truk from Kwajalein by Admiral Mitscher's fast carrier Task Force 58.

The story of the operations of the Fourth Marine Air Wing (Central Pacific), under Major Gen. Louis E. Woods, and the campaign in the Mariana, Palau and the Philippines, as well as the important part played by Marine flyers in the South Pacific Combat Air Transport Command (SCAT), and in night fighting, will be told in a subsequent article.

NAVIGATOR

1918 First crude radio sets used by the Jetties and DeHavillands of World War I were powered by wind-driven generators built by Westinghouse. They were relatively heavy and bulky by today's standards.



Since the days of DH's... answering aviation's need for

"MORE WATTS... LESS WEIGHT!"

Since the day the first DeHavillands and Jetties found a need for power to energize the earliest aircraft radio, the aircraft industry has voiced a recurrent need:

"Give us WATTS—but hold down WEIGHT!"

From that day to this, Westinghouse engineers have worked hand-in-hand with aircraft builders and designers to supply that need. How well they have succeeded may be judged by the progress of d-c generator design. Today's Westinghouse Aircraft Generators supply the highest output-to-weight performance.

Dynamotors—for transforming d-c power to higher or lower voltage—also have grown smaller and lighter in proportion to their ratings, thanks to Westinghouse engineers. The progressive development shown here has contributed to the wider and greater usefulness of electrically powered auxiliaries and controls in planes.

Westinghouse efforts toward taking the weight out of kilowatts are continuing—and will continue. They offer another sound reason for making Westinghouse your electrical partner in aviation progress. Westinghouse Electric & Manufacturing Co., Lima, Ohio 16800



1931 The light, microminiature dynamotor—first of its kind—was introduced by Westinghouse.



1934 The trend toward lighter and more powerful advanced types with the improved dynamotor.



1944 Small, sleek and powerful in proportion to its weight, today's Westinghouse dynamotors further contribute to weight reduction in the communications and control systems of our present-day flying planes.



Electrical partner of the aviation industry



Westinghouse
PLANTS IN 21 COUNTRIES OFFICES EVERYWHERE

YESTERDAY... TODAY... TOMORROW

AVIATION NEWS • December 25, 1944

Arnold Finds Premature Optimism Cutting Down Plane Production

General, in quick tour of West Coast plants, discloses that A-26's, B-29's and P-38's are behind schedule and B-51's and B-24's ahead; blames overconfidence for relaxation of effort.

Gen. H. H. Arnold made a quick tour of Southern California aircraft plants recently to see whether manufacturers "have a correct estimate of how the war is going." What he said to aircraft company presidents and production executives may be guessed by facts brought out in the general's only Los Angeles press conference.

Behind schedule in the West Coast's production of Douglas A-26 attack bombers, Boeing B-29's and Lockheed P-38's.

Ahead of schedule in the West Coast's production of North American P-51's and Consolidated Vultee B-24's.

Major West Coast airplane builders have hired 348,916 new workers in the past 18 months, but 177,449 have quit in the same period.

After his plant visits, General Arnold showed serious concern over the effect on war manpower of "premature optimism" that is spreading throughout the United States.



KINGCORBA PRODUCTION LINE

This unusual view shows the progressive development of a Bell P-52 Kingcobra along the production line at the Niagara Falls plant of the Bell Corp. In the foreground is the basic fuselage structure. In the center the planes begin to take shape, with the addition of the cockpit structure and the tail. On the far line are the virtually completed ships, showing the compact installation of engine behind the pilot. The bulk of Kingcorba production is going to the Russian Air Force.

Mum on New Craft

These highlights of the European and Pacific Air war were developed in Gen. H. H. Arnold's Los Angeles press conference last week.

His early comment on the reported development of new big bombers (B-25, B-35, B-42) was, "I don't want to talk about them. I want the German and Japs to learn of them the hard way."

Asked to comment on American jet production development, "Hiller would give several hundred thousand dollars to know any answer to that one."

Germany today is leaving virtually unattended many beaching targets, but is "very active about certain other targets, and shoots the works at our bombers striking at them."

German fighter pilots of today fail to show either the skill of attack initiative of the old German air force, nor has Japs today the "sneaky pilots of some time back." To point the finger, General Arnold cited the recent case of 18 P-47's forcing a flight of 69 ME-109's to break and run with an ultimate loss of 19 German fighters. He believed serious fuel shortage has forced heavy curtailment of German pilot training. He said that after a raid on Japan by 15 B-29's, only 15 planes were found in the entire group of planes, despite the fact that it took time 70 Jap planes took off of the B-29's.

Harbors of Jap jet plane development have borne no fruit. No Jap jet planes have yet been seen.

performed aircraft workers since the first of the year have given West Coast manufacturers a persistent manpower headache.

Knowledge that military induction has been responsible for varying percentages of separations by workers who have labored steadily in the plane plants from one to more than five years does not relieve their worry appreciably. They feel that many workers refuse to be convinced that their presence is vital to the winning of the war and that they are quitting to establish themselves in civilian business pursuits.

Military Jets Decline—While military induction "grains" reached a peak 24.32 per cent in May, 4,544 workers throughout the West

Dependable all around duty assured with Simmonds Push-Pull Controls



WIST TO CARRY THE YELLOW DOG

of Army Air Force Waterland acceptance for operation in extreme temperatures in the Simmonds-Corby Push-Pull Control. Comprehensive tests with temperatures as low as minus 72°F., and as high as 140°F., prove efficient operation under wide variety of conditions.



STATIC STRAINER Is the last Simmonds push pull control accessory. With its safety and compressive forces of 450 lbs. Craft simplification of design, improved fittings.



EXPANSION Cycled 30,000 times under stress, no Simmonds expansion valve is not affected in any way, and can be expected to extend the life of unit served.



STRAINER Input-output ratio of control is measured at various temperatures in machine chamber. Result: average efficiency is twice the AAF requirement.



PRECISION CONTACT Motion between lens and compressive to negligible Simmonds maximum test degree .001", .001", .001". Simmonds are precision built controls.



INFORMATION AAF specifications call for loads ranging from 10 to 20 lbs. Allowable average deflection is .348". Simmonds controls average only .025".



CUSHION Simmonds controls meet AAF specifications for cushion resistance with standard cushions placed or modified surface. Tube ends are rubber sealed.

ENGAGED removing War Concerns as Post War problem, working push pull control equipment are tested. Our service engineers will furnish you gladly with analysis and recommendations. Telephone or write to your nearest Simmonds office.

SIMMONDS EQUIPMENT FUEL WITH EVERY TYPE OF AIRCRAFT

American Equipment Company — Push-Pull Controls — Push Pumps Hydraulic Actuators — Hydraulic Press — Cincinnati Radio units Bell-Ringing Push Bell Assembly — Push Bell and City of San Francisco Design

30 Rockefeller Place,
SIMMONDS
AEROGESSES INC.
New York 20, New York



HYDRAULIC GOVERNOR

*Designed and
Built by
Marquette*

- This Hydraulic Governor for Diesel engines is a good example of our skillful engineering and precision machining. After Victory is won, part of our facilities will be available to you.



The **Marquette METAL PRODUCTS CO.**
CLEVELAND 10, OHIO

Manufacturers of: HYDRAULIC AND ELECTRIC OVERSPEED DEVICES FOR AIRCRAFT
HYDRAULIC CONTROLS FOR DIESEL ENGINES • POLYMER BEARING TESTER DEVICES • FUEL CO. PUMPS
AIR COMPRESSORS • PRECISION PARTS AND ASSEMBLIES

Coast plane industry—the percentage was down to 471 for the last-titled month of October.

"Quits" by workers leaving one year or less employment continued to give the West Coast industry its highest loss ratio, a maximum of 71.51 percent last January and 50.77 percent in October.

Of greater concern, however, is the fact that three-year workers now are leaving the industry in increasing numbers. At the start of the year, "quits" by this class of worker accounted for 4.66 percent of all separations.

► **Induction Rate**—Military inductions boosted this percentage to as high as 12.63 during the months from March through July. However, the tapering off of military induction "quits" failed to restore the January average. Three year "quits" in August accounted for 7.65 percent of all separations. The figure rose to 8.26 percent in September, and to 10.35 percent in October.

Similarly four-year "quits" have risen from 1.52 in January to 3.35 percent in October. "Quits" by workers employed five years or longer were 4.5 percent in January—1.5 percent in October.

Seek B-29 Workers

Boeing opens coast-to-coast recruiting campaign to meet increased Army demands.

Boeing Aircraft has undertaken a coast-to-coast recruiting campaign in 12 states to meet increased demands by the Army for the B-29 Superfortress.

The recruiting is under direction of the U. S. Employment Service

Navy Plane Output

Status of naval aircraft production, as reported by Rear Admiral DeWitt C. Ramsey before House Appropriations Committee:

"Our production at present is in fair shape, but it needs constant attention because of the modifying interests of the Army, of course, in their heavy steel program, and in the congested areas such as those on the West Coast. . . . It is a fight to hold on to our manpower and to avoid separations from the vital industries."

"We have lost in a relatively few months 140,000 workers in the aircraft industry, and that is the area that faces war production today and I would say it is the only real weak element in the program today, but it is a serious one. There are no serious material bottlenecks. . . ."

of the War Manpower Commission with members of Boeing's Personnel division expounding, an indication of the importance attached by the Government to the B-29 production program. With a critical manpower situation in the Puget Sound area in which the Seattle and Renton plants are located, material recruiting was the only recourse.

For the past several weeks new workers added as a result of the recruiting have totaled slightly over 300 a week.

► **Capacity Production**—C. L. Enevold, Boeing chairman, said recent additions to the Army contract for Superfortresses from the

Seattle and Renton plants insure capacity production at these two factories and at the company's branch plants in Western Washington well into the spring of 1945. This backlog represents in the neighborhood of \$1,139,000,000.

While there remains a steady demand for more women workers, because of the higher turnover, it is important that a higher percentage of men be hired. B-29 production planning indicates a need for at least 10 percent men and preferably 15 percent. The percentage of men in direct factory work has decreased from 41 percent on Jan. 1, 1944, to 43 percent at present.

Ramsey Reveals Cut In Navy Air Needs

Bureau of Aeronautics chief tells House Appropriations Committee of the changed situation in aircraft procurement.

Reduction in limitation of the amount of contract authorization for Naval aviation was disclosed in testimony before the House Appropriations Committee by Rear Admiral DeWitt C. Ramsey, chief of the Bureau of Aeronautics, due to the changed situation now existing in procurement of naval aircraft.

The reduction was from \$3,665,995,600 to \$1,666,000,000 of which lower amount, not to exceed \$250,000,000 may be used for expansion of and facilities in public and private schools.

► **Losses Under Estimate**—At the time the 1945 estimate was submitted, WPM urged the Navy to



NAZI UNDERGROUND AIRCRAFT PLANT:

Shown above are two views of the Nazi's underground aircraft plant at St. Arner, 85 miles east of Bordeaux on the Life River. Entrance is shown as

well as an interior set-up of lathe, mostly German and American make. Note light and power lines overhead.

award aircraft contracts from 12 to 18 months in advance, in order to maintain full production. This so-called lead time is now considerably less, requiring the placing of much fewer advance orders in the fiscal year 1945. Also losses of planes to date have been less than had been anticipated. These factors have combined to reduce drastically the number of naval airplanes which must be ordered in 1945.

It is now estimated that the amount of contract authorization required for this fiscal year will not exceed \$1,600,000,000 and Admiral Halsey recommended a reduction of \$2,035,000,000 from the original estimate.

At the time the 1945 budget estimate for aircraft construction was submitted in January, 1945, it was estimated that funds and contract authority were available for procurement of the 15,193 airplanes then remaining from the 1944 program of 27,542 planes, including spares and equipment.

Procurement Policy Changed.—Then 15,193 planes were expected to be ordered during the period from Jan. 1, 1944, to June 30, 1944. These financed aircraft were scheduled for production during the latter half of the fiscal year 1944 and in the majority of cases well into the first quarter of the fiscal year 1946. As of Dec. 23, 1943, it was estimated that approximately \$4,000,000,000 (including \$566,000,000 balance from the 1943 appropriation transferred to the 1943-44 appropriation) was available for obligation.

However, due to a change in naval aircraft procurement policy which reduced the lead time in placing airplane contracts from 12 to 18 months prior to scheduled production, only 8,466 planes, at an estimated cost of \$2,598,000,000 were actually ordered for procurement during the last six months of the fiscal year 1944.

The 1,223 airplanes, at an estimated cost of \$554,354,000, released for procurement since July 1, 1944 to date, carry naval aircraft production to about September, 1945, and in effect complete the 27,542-plane program of 1944 with an unobligated balance of approximately \$1,185,000,000.

In order to cover the cost of current naval airplane production schedules through June, 1946, Admiral Halsey said, as a result of orders placed prior to July 1, 1945, it is now estimated that about

7,000 fewer aircraft will be required than that \$1,185,000,000 less will be required than provided by Congress in the 1945 budget.

The 1944 program was for 27,542 airplanes and for 1945 it was 24,326.

New Methods Speed B-25 Settlement

Revised system can cut tape and negotiation time; \$1,590,752 payment approved as less than 60 days after filing of claim.

Recent settlement of claims arising out of the hundred million dollar North American Aviation contract for production of the B-25 Mitchell bomber have demonstrated the adjustment to the changing needs of war production and speed in settlement of contractor's claims.

The situation arose, as reported by the Air Technical Service Command when the ANF denied to concentrate B-25 production at North American's Kansas City plant so that the entire facilities of the Indianapolis, Ind., plant could be devoted to building the P-51 Mustang. The Southern California plant was notified on Feb. 8, 1944, that it would make no more B-25's, and on July 7 turned out the last of the 3,200 Mitchell's produced in slightly over three years of production.

Filed in 48 Days.—On Sept. 4, North American submitted its claim to the Western District of ATSC and 28 days later a requested settlement of \$1,590,752.83 had been reached. Payment of the claim was approved Oct. 27, less than 60 days after the filing of the claim.

During the progress of the negotiation, the Government received \$1,164,576.55 on raw materials and purchased parts which were diverted to production in other plants and it was expected that eventually about 66 percent of the cost of the remaining inventory will be recovered by the same method of transfer.

Speed Landings.—Sgt. Gen. Donald F. Stone, Commanding General, Western District ATSC commented that the speed with which this highly involved claim has been settled is evidence that they that they have a definite obligation under the Contract Settlement Act of 1944, and will follow the Army Air Forces' lead of speeding war, with full power to act, to the

job of cleaning up unfinished war business.

Col. E. W. Rawlings, chief of the Readjustment Division, ATSC, which is charged with contract adjustment and plant clearance for the ANF, pointed out that the production staff was so outstanding the example of adaptation to changing war requirements. He said that contract adjustment as represented by this shift of production from B-25's to P-51's is one of the most valuable methods of meeting the need for flexible war production.

\$5,000,000 Orders Placed with Republic

Conditional orders totaling more than \$5,000,000 were reported booked by Republic Aviation at the St. Louis convention of the National Aviation Trades Association, indicating the interest of personal aircraft distributors in Republic's post-war entry into this new field of activity with their Thunderbolt Amphibian (NAVIA-Navy Model 24).

Shipments of Republic's ships on the P-47 Thunderbolt fighter for 1944 will approximate \$480,000,000. Employment at Republic now totals 17,248.

A special dividend of 28 cents a share, payable Dec. 28 in stock of record Dec. 23, has been voted.

Convair Fort Worth Makes 3000 B-24's

Fort Worth division of Consolidated Vultee has produced more than 3,000 B-24 Liberators and C-57 Liberator Express transport since the first Liberator came off the lines in April, 1942.

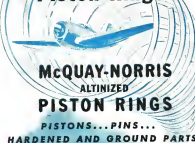
While C-57 production was discontinued at the Fort Worth division several months ago, the plant is now stepping up work on the new B-32 Dominator bomber, details of which still are restricted.

Kinner Buys Gladden

Kinner Motors has acquired the Gladden Products organization, hydraulic control manufacturers, and will continue to operate the plant at the Gladden company.

Kinner plans to diversify its operations for the post-war market, and the new plant, situated a few blocks from the Kinner factory in Glendale, Calif., will fit into the production picture both for war and peace output.

Air Power Through Piston Rings



More and more, the leading makers of aircraft motors are using McQuay-Norris precision parts. Our 34 years' experience in precision manufacture, our long and intensive work in metallurgy, heat treating, clinical research and laboratory experiment, enable us to turn out the sturdy, dependable parts demanded by modern aviation. Your inquiries are invited.



PARTS FOR AIRCRAFT ENGINES

- Piston Rings
- Oil Sealing Rings
- Supercharger Rings
- Carburetor Parts
- Machined Aluminum Pistons
- Piston Pins
- Counterweight Check Pins
- Machined Magnesium Parts
- Cylinder Head Drive Nuts
- Hardened and Ground Parts

PARTS FOR PROPELLER ASSEMBLY

- Machined Magnesium Parts
- Piston Rings

EQUIPMENT FOR MAINTENANCE OF AIRCRAFT

- Pistons for Oxygen Compressor
- Piston Rings for Oxygen Compressor
- Piston Rings for Oxygen Compressor
- Pistons for Air Compressor
- Pistons for Air Compressor
- Pistons for Air Compressor

LANDING GEAR PARTS

- Machined Aluminum Pistons
- Piston Rings
- Hardened and Ground Parts

Here IS THE CHALLENGE

... a vast national income which will assure the dignity of productive jobs for all!

Experts have estimated that to maintain our economy and assure full employment our nation must continue an annual national income of at least 150 billion dollars. To accomplish this the U. S. must successfully develop the full potential of its domestic and international resources. Trade must be implemented by effective transportation.

To assist in the stimulation of commerce, Braniff Airways, Inc., and Aerovias Braniff, S. A. propose a coordinated plan of air service for the Americas. The routes planned would help to provide needed transportation among the principal productive areas and their markets in this hemisphere.

BRANIFF AIRWAYS

"The airplane has developed and thrived because... it quickens understanding among people and stimulates trade among them... It will bring the nations of the Americas closer together or as it was more fully developed."

ERIC A. JOHNSON
President United States
Chamber of Commerce

Legend of Lines:
Braniff Airways, Inc.
is the international
Aerovias Braniff, S. A.
operates for

PERSONNEL

L. B. Knapert has been named manager of United Air Lines' foreign agency and tour department.



Knapert, for the past two years president of the American and Tourist Agents Association, will be based at Chicago headquarters of the airline to supervise agency work intensively and to handle tour promotions in the post-war period. In 1943, Knapert joined the office of the Coordinator of Inter-American Affairs, specializing in travel and services, subsequently he became director of the office's service operations division.

Langford H. P. Blitt, whose election as vice president of Luscombe Airplane Corp., Trenton, N. J., was announced in Aviation News Oct. 8, has been elected president, succeeding A. C. Hodgins, Jr., who has retired. **Cherokee L. Bagel**, who has been secretary and assistant treasurer, has been made secretary and treasurer. Bagel formerly was

president and executive manager of the New York Credit Men's Association.

Richard W. Sylvester has been named traffic manager of Pan American-Grace Airways, Inc., for South America. He has been special representative for Panamsa at Baltimore, Canal Zone, and has been active in traffic sales. Before joining Panamsa, Sylvester was associated with the traffic department of W. R. Grace and Co., in New York.

Ray C. Sylvester (photo) has been appointed director of engineering at Bendix Aviation Corp.'s Edgemoor Division.



Sylvester has been chief engineer of Edgemoor Power for the past three years and made important contributions to the development and

production of light, aviation and engine instruments. He succeeds W. A. Schuler, who resigned. Sylvester joined the company in 1935 as assistant chief engineer.

Robert J. Danusso, Jr., manager of Woodward Field for the past eight years, has resigned to become chief of the airport management section, Airport Division, Civil Aeronautics Administration.

Recent appointments at Kellitt Aircraft Corp. include that of **John G. Rosenbark** to be assistant to the executive vice president. Rosenbark has been in the aircraft industry for ten years, eight of which he was an industrial engineer for Bell Aircraft Corp. **Walter H. Bauder**, new production control manager, replaced Rex Beckley, now with Lockheed Aircraft Corp. Bauder spent two years with Consolidated Valve Aircraft Corp. and during the past year has been with Kaiser-Fleischer Corp. as production manager. **John H. Bystrum** became an assistant to the general superintendent.

A. F. Lauer has been appointed assistant general sales manager of Sperry Gyroscope Co., in addition to his duties as manager of the special electronics department and the federal sales department. An assistant general sales manager, Lauer will be responsible for planning sales department product programs and coordinating these programs with the engineering department and the customer.

Lieut. Col. Thomas J. Heston (photo), recently returned to the United States

after two years and five months as a procurement officer attached to the Air Service Command in England. He is taken over as the post of Army Air Force resident representative at Wright Aeronautical Corp., a division of Curtiss-Wright Corp. Colonel Heston succeeds **Lieut. Col. C. R. Beckwith**, who has been assigned to the office of the Air Service Command, Eastern District, with duties in the office of the Deputy Commander.



Walter E. Peck, newly appointed sales manager of Rheometric Laboratories, Inc., Indianapolis, will have charge of the sales of all products, which include viscometers and vibrator power supplies.

J. E. Thomas has been named manager of general sales in the Industrial Products Sales Division of B. F. Goodrich Co., in which capacity he will direct the sale of all new and modern materials handled by the division.

Paul E. Hayward, (photo) widely known aeronautical engineer and pilot, has been named assistant director of the research section of Curtiss-Wright Corp.'s airplane division at Buffalo. Hayward served previously as director of flight tests for the Airplane Division. He will be associated with Dr. C. F. Fawcett, research laboratory director. Hayward has been an aviator since he joined Travel Air manufacturing in 1926 and became chief engineer. He was chief engineer of the Curtiss-Wright and Pitcairn Autogiros.



Col. Horace A. Shepard has been named acting chief of the production section in the Procurement Division of the Air Technical Service Command, in addition to his duties as chief of the division's model section. He succeeds **Col. George E. Price**, who has left Wright Field as an unattached member.

Herrell C. Meigs, civilian consultant to the Air Technical Service Command director, **Lieut. Gen. William Keadler**, accompanied him as a recent war of factories. Meigs served as director of the Aircraft Production Division of the War Production Board.

WINS COLLIER TROPHY:

Capt. Louis de Floren, who was awarded the Robert J. Collier Trophy for 1943 for his contributions to the safe and rapid training of naval pilots and crews for the Navy through the development of aquatic devices. **Gen. Henry H. Arnold** was awarded the trophy for 1942 for his organization and leadership of the AAF Captain de Floren, a pilot, is director of special services for Navy's Bureau of Aeronautics.

Investment Analysts' Consensus Gives Airlines Over-Average Rate

Aircraft manufacturing issues estimated at "average to below" by Bendix, Douglas, Lockheed, Sperry and United listed as favorites with better prospects than balance of group.

Forecast of aviation's future continues to be touch and go among the investment advisory services.

In its annual forecast for 1944, Poor's investment advisory service attempts to rate all active stocks included in this group is a wide representation of the aviation group. The accompanying table presents these selections along with their market ratings. Poor's has attempted to forecast final 1944 earnings for the airlines but has eschewed making any such prognostications for the aircrafts—with but two exceptions, Bendix and United Aircraft.

It can be seen that the airlines continue in high favor with a strong preponderance toward "above-average" ratings. America is clearly the favorite with an outright "buy" recommendation. Surprisingly enough, Pan American is considered "average to below."

Airlines—As a general rule, the airlines draw "average to below" as their ratings. Bendix, Douglas, Lockheed, Sperry and United Aircraft are credited with "above

average" (Bendix is considered a definite sale).

The forecast of 1944 airline earnings falls short of the mark. For instance, American earned \$6.87 per common share for the first nine months of the year, yet Poor's thought the company would earn only \$4.75 for the entire year. Similarly, United actually earned \$3.23 per common share for the initial nine months, as contrasted to Poor's guess of \$2.80 for the entire year. Also, TWA earned \$2.94 for the nine months compared with the estimate of \$1.60 for the year. Eastern is expected to show 1944 earnings of \$2.65 but actually earned only \$1.22 per share for the first nine months and probably will fall short of Poor's estimate. As the same forecast number but in a different compilation, Poor's also lists some outstanding low priced stocks. In this group are three aviation companies: Of Piper Aircraft, Poor's says a "heavy postwar demand is indicated"; Republic Aviation—"has good industry position"; and Western Air Lines "prospects are improved by

route expansion." All companies are rated "A,"—above average—according to Poor's.

Poor's Aircraft Analysis—In a current analysis of the aircraft manufacturing industry, Moody's stock analyst asserts: "The great difficulties, prospective credit after the war, in the volume of aircraft manufacturing has been widely anticipated for so long that its potency as a market influence seems to be waning out." A bullish and declamatory has featured the aircraft market pattern with the past year's strength viewed as an upward phase in a series of backing and filling movements. The accompanying chart shows the aircraft trend compared with the general market.

Moody's believes the public has been slumped minded regarding the aircrafts and much of the market's reaction has been to have been accomplished. The service opines: "From now on aircraft manufacturing stocks should be watched for buying occasions, in a selective way, and especially avoided at this late stage in the adjustment of the postwar economic outlook."

Among the favorable factors Moody's believes that the better companies have very favorable financial positions in relation to the prospective decline in volume. Further, it is maintained that the pessimistic outlook for the aircraft manufacturing companies will not be offset by what may appear as excess capacity.

Favored Stocks—The advisory service feels that the individual companies who have achieved success in a military field will probably do well in commercial plane development. In this respect Boeing, Douglas, Lockheed and United Aircraft are favored. Presumably these equities represent favorite vehicles for speculation on market weakness by investors who "have no representation in the group at the present time." It is conceded that, because of the variable volume construction there may be some anomalies among the established plane makers but "there will also be some strong survivors."

In an interesting poll undertaken by Patrick, Wobser, Jackson & Curtis, a leading New York stock exchange firm, the aviation group fared very poorly among the outstanding peace beneficiaries. Statisticians and collaborators on the stock exchange firm's aircraft were asked to select six industries consid-

ing to benefit most from ultimate return to peace. Among the various industries, six favored the poor fifteenth among the groups selected. Aircraft did not even show among the 33 industries forming the compilation.

Results of Poll—In this poll, among 326 votes distributed through 19 lots of 12 stocks each, the following airlines received one vote apiece: American, Braniff, Eastern, PCA, United and Northwest. In the aircraft group only Bendix and Douglas received one vote each. Bendix also received one vote but was classified in the automotive group.

It is interesting to see the diverse reaction these equities for example between the Paine, Webber group and Poor's investment ratings. The stock exchange firm's compilation is even more interesting when it is realized that aircrafts are placed in proper perspective all industry groups. On this basis, the much heralded peace beneficiary—air transport—is far less favorably situated than such groups as the food and equipment, autos and even railroads.

128 Radio Devices Produced by Bendix

Output of division of aviation country ranges from compasses to instrument landing systems and control networks sales for fiscal year reported at \$148,750,816.

More than 128 types of communications equipment—radio and radar devices for aircraft and other military and—were produced by Bendix Radio Division of Bendix Aviation Corp., which reported gross sales of \$148,750,816 for the fiscal year ended Sept. 30, 1944. One of the major products of the Bendix Radio Division is the instrument landing systems and control networks.

Philadelphia Division of Bendix Aviation reports an all-time production high in aircraft flight instruments and other warfare equipment during October with shipments totaling nearly \$5,000,000, reflecting increased Army requirements for precision devices.

New Comp—Raymond P. Lanzing, vice-president, points out that the Flux Gate compass, second new product to have been developed in 4,500 parts, a standard equipment on the Superfortress

Poor's Aviation Earnings and Market Ratings									
AIRLINES	1943	1944	1945	1946	1947	1948	1949	1950	1951
American	100	100	100	100	100	100	100	100	100
Braniff	100	100	100	100	100	100	100	100	100
Eastern	100	100	100	100	100	100	100	100	100
PCA	100	100	100	100	100	100	100	100	100
United	100	100	100	100	100	100	100	100	100
Western	100	100	100	100	100	100	100	100	100
Boeing	100	100	100	100	100	100	100	100	100
Douglas	100	100	100	100	100	100	100	100	100
Lockheed	100	100	100	100	100	100	100	100	100
Sperry	100	100	100	100	100	100	100	100	100
United Aircraft	100	100	100	100	100	100	100	100	100
Bendix	100	100	100	100	100	100	100	100	100
Piper Aircraft	100	100	100	100	100	100	100	100	100
Republic Aviation	100	100	100	100	100	100	100	100	100
Western Air Lines	100	100	100	100	100	100	100	100	100

and other bombers and that its expected production of these companies to continue to expand and to remain high after hostilities have ceased. None of the intercontinental airlines can be supplied at this time.

A continuing demand for flowmeters, devices developed by Bendix to indicate accurately the rate of gasoline consumption and which are now being supplied primarily for the B-29 program, also was predicted by Lanzing.

While the dollar volume of all products is currently at a record high, Lanzing and present activities call for increasing production another 10 to 15 percent per month by January and forecasts based on recent estimates by the armed services as to their probable demands indicate the peak rate will be continued during all next year.

Financial Reports

Solar Aircraft of San Diego and Los Angeles had net sales of \$14,750,832 for the first half of the fiscal year ended Oct. 31. Unaudited figures showed a net income after provision for taxes and reorganization reserves of \$432,178. This is equivalent to earnings of approximately \$1.34 per share on the \$1 per value common stock.

E. T. Price, president, said operations of the company are increasing with a present backlog of \$100,000,000, not including anticipated orders for exhaust manifolds and

parts for jet propulsion power units amounting to approximately \$125,000,000, which are now under negotiation.

Liberty Aircraft Products reported sales for nine months ended with August at \$10,535,731, compared with \$10,535,731 for the same 1943 period. After provision for taxes and possible losses resulting from war conditions, net profit transferred to surplus was \$418,707, equal to \$1.46 on 287,500 new common shares outstanding following the recent two-for-one split.

Stock Transactions By Airline Officers

Dealings of executives in securities of own companies disclosed.

L. H. Dwyer, executive vice-president of Western Air Lines, Inc., purchased 2,660 shares of the company's common stock during October, according to a summary of security transactions filed with the Federal Reserve and Exchange Commission. The acquisition brought his holdings in Western Air to 10,890 shares.

James Ward, director and principal stockholder of Brecoast Aeronautical Corp., sold 1,700 common during the month, reducing his ownership to \$9,150 shares. **Jark L. Outman**, an official of Solar Aircraft Co., sold 900 common, leaving him with a balance of 38,000 shares. **T. L. Laddington**, director of Jacobs Aircraft Engine Company, reported the sale of 800 shares of the company's capital stock through a trust. At the close of the month there were 3,899 shares in the trust.

Leon A. Swirral, executive vice-president of Grumman Aircraft Engineering Corp., sold 900 common, giving him a balance of 38,000 shares at the close of October.

Robert E. Gross, president of Lockheed Aircraft Corp., received 35 shares of the capital stock as a gift, increasing his holdings to 31,600 shares.

Pipes—Bix Boohe, assistant secretary of Piper Aircraft Corp., received 30 common through an exchange, raising his holdings to 435 shares.



NOTE: Principal trading dates of aircraft manufacturing stock average and Dow-Jones Industrials for the same dates are shown.

TRANSPORT

CAB's Northwest Opinions Point to Merger, Interchange

Decision makes airline fourth transcontinental carrier; PCA also gains entry into New York.

By DANIEL S. WENTZ II

Using as their point of departure the Civil Aeronautics Board's decision in the Chicago-New York case, which established Northwest Airlines as the fourth transcontinental air carrier and extended PCA's system from Pittsburgh to New York, Chairman L. Welch Pogue and Vice-Chairman Edward P. Warner last week outlined in two separate opinions their theories of merger and interchange as the alternative development policies which U. S. domestic airlines soon must face.

Pogue's dissent was devoted to a discussion of a possible merger between Northwest and PCA, a solution he viewed as preferable to that adopted by the majority in granting both lines access to New York. Dr. Warner's opinion considerably enlarged the existing concepts of inter-line coordination, and directed the industry's attention to unexplored areas in which unified forms of interchange and similar two-carrier arrangements might be worked.

Forerunners—The dissents of Pogue and Warner were in-

terpreted as forerunners of what the Board's position with respect to the existing service may be in the future.

After outlining the Board's responsibilities in developing a sound and economic air transportation system, Pogue said: "I had hoped that the Board would defer its decision as the two applications I am considering here and give Northwest and PCA time to work out some consolidation or merger."

"If these two entities were combined, we would have a fourth among transcontinental carriers."

"I believe," he continued, "that only in the event of such a consolidation or merger would the public convenience and necessity justify the authorization of access to New York."

Merger Discussed—Although Pogue's statement on the Northwest-PCA combination left some doubt whether he was suggesting the merger or was referring to a plan already under discussion, Aviation News learned reliably that representatives of the carriers had broached the subject, pre-

ably with the knowledge of some Board officials.

The Chairman stated his belief that the standard of public convenience and necessity set forth in the Civil Aeronautics Act was a "very broad one designed to permit and require the Board to carry out the basic objectives of the Act." Some lawyers, however, were of the opinion that the law as it now stands would not permit the Board to require mergers, although some agreed it might readily encourage such action in fulfilling its statutory functions.

Dr. Warner's opinion reopened the question of interchange and had before the industry a number of new ways in which carriers might coordinate their activities. It was interpreted as a companion piece to Pogue's remarks, the two, taken together, forming opposite sides of a problem the airlines probably will have to face.

Parallel Competition—Warner pointed out that the introduction of Northwest and PCA into New York created parallel competition among four carriers between Chicago and New York and Detroit and New York. Parallel competition, he went on to say, serves a useful purpose on some routes, but obviously has some limits.

The answer, he continued, lies in new forms of interchange. "The possibilities of such arrangements are far from having been explored to their limits in the past," he said.

Among his suggestions for closer inter-line coordination he mentioned:

Agreements on mutually satisfactory financial terms whereby one carrier would operate its planes over another's routes, or



Oliver L. Porks Announces the Opening of a Resident School of the Air for Young Women Exclusively, at the Alabama Institute of Aeronautics

This resident school of the air is for young women exclusively. It is an exciting time of the dominant part to be played by young women in the age of personal flying. It is offered to young women who want to add Air to women in their other accomplishments. Courses offered you in flight instruction and ground school training lead to a U.S. Private Pilot's Rating in a 12 month course of training.

Your flight and ground school training at Alabama Institute will be on the same excellent campus where, for the past 5 years, U.S. Army Air Force Cadets, Royal Air Force Cadets, 7000 French Cadets, Civil Pilot, and U.S. Service Training have been given. You will study under the same experienced, expert and experienced who successfully graduated 300% of the students of the original Civil Pilot Training class in 1938. You will have the advantage of the experience passed since that as being over a quarter million hours in flight instruction.

For the 12 weeks of your training, you will live on the situation school campus in comfortable modern halls.

Alabama Institute of Aeronautics—the resident Pilot school for young women exclusively—is an affiliate organization of the well-known Porks Air College for young men at East St. Louis, Ill.

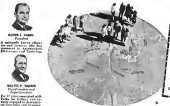
Admission are limited and selective. Qualified applicants are given preference in the order in which applications are received.

Write for Bulletin which provides detailed information. Classes begin February 15 and April 2.

ALABAMA INSTITUTE OF AERONAUTICS

Highways Van De Graff Field

204 miles west from the heart of Southern Pinebluffs



ALABAMA INSTITUTE OF AERONAUTICS
P. O. Box 4822
Tomball, Alabama

Please send me your catalog giving complete details of the 12 month course of flight and ground school training.

Name: _____ Age: _____
Address: _____
City: _____ State: _____



TWA STRATOLINERS IN RECONVERSION PROCESS:

Picture at left shows one of TWA's Stratoliners as it returned to Boeing's Seattle plant, where five of these ships were fitted with new Flying Fortress wings, engines and landing gear. At right is a closeup

taken as new horizontal stabilizers and elevators were installed, flush with rudder and end of tail cone. Original stabilizer assembly was about 2 feet forward, as can be seen by outline on ship's skin.



Entirely Collins equipped...

BRANIFF AIRWAYS, INC. has been using Collins ground transmitters since 1935 and Collins aircraft transmitters since 1937.

It was the first great airline to recognize the superiorities of Collins design, workmanship, and performance, the first to avail itself of the precise, sturdy, reliable Collins Autotone.*

Today Braniff uses Collins multi-channel or Autotone equipment at every point at which it has a radio station, and every ship in its Super B Liner fleet carries a Collins 17F Autotone aircraft transmitter.

There is a deep satisfaction in having supplied the nerve-system on which Braniff relies in maintaining its magnificent record of safety and operating efficiency.

When Collins turned to war production, it could apply the know-how that came from furnishing communication equipment which met the exacting needs of Braniff and other major airlines. When it turns to civilian design and production, it will add to that know-how the tremendously increased, intensified experience acquired in its services to the Armed Forces. Collins Radio Company, Cedar Rapids, Iowa.



*The Collins Autotone is a reproducing mechanism which quickly shifts all transmitter or receiver tuning controls simultaneously and with extreme precision to any one of a number of pre-determined frequencies. Patents issued and pending in the USA and other countries.



each might make an extension of service on certain schedules.

►Flight crews of the original carrier might operate the plane to its ultimate destination, with certain flight personnel qualified for certificated routes of another carrier.

►If the number of schedules so operated was substantial, dispatching and ground service personnel might be stationed along the other carrier's routes.

►Sale of transportation and contact with passengers would be left entirely to the carrier certificated for the route.

Such arrangements, Dr. Warner pointed out, could permit two quite distinct services operated over the same route, "but with a common commercial objective, traffic man-

agement, and coordinated and agreed planning and scheduling in place of a direct competition which might be in excess of anything that the conditions of the route would justify."

Such interline arrangements, he said, were not only possible between Northwest and PCA in the present case, but there were "other instances that seem conspicuously fitted" for such operating agreements. He said the fact that portions of a potential through route being certificated to different carriers need not interfere with their making arrangements for through operations, presumably indicating the Board's willingness to encourage joint operations.

Swedish, Danish Agreements Signed

The State Department has announced signing of commercial aviation agreements with Sweden and Denmark, effective Jan. 1, 1945. The former contemplate routes between New York or Chicago and Stockholm. The latter is similar and grants rights to U. S. airlines in Denmark and Greenland, specifying that the Jan. date is provisional, and definite on confirmation by a free Danish government when established after Denmark's liberation.

The agreements, which followed

announcement that a pact had been signed with Spain, raised standards adopted at the International Civil Aviation Conference for such bilateral arrangements.

Traffic Conference Plans Reorganization

Increased emphasis to be placed on cargo in AIA unit's new setup.

Steps to place cargo on a par with passengers in deliberations of the Air Traffic Conference, a division of Air Transport Association, are being taken by the Conference in a reorganization plan approved at the recent Washington meeting.

The plan outlined in the accompanying chart, contemplates under the overall direction of the Conference two divisions with exclusive jurisdiction respectively over passenger traffic matters and cargo traffic matters, including mail.

►Basic Change—This separation of passenger and cargo sections of the Conference is a basic change, since cargo has heretofore been handled by one of the committees of the organization.

A special committee composed of W. G. Lipscomb of American Airlines, chairman; E. G. Cooke of



WESTERN ORDERS DC-3'S AND DC-6'S

Douglas Douglas (left), seated in pilot house of a C-54, holds contracts for post-war four-engine airliners. At right is William A. Coulter, president of Western Air Lines. WAL has just negotiated for five DC-6's and five DC-3's. Purchase price was close to \$5,000,000.

TWA, and Edward Sullivan of PCA, was appointed to deal with details of the plan, including such changes in Conference bylaws as may be necessary. Attention will be given particularly to avoidance of any bylaw amendments that would limit international operations. Two or three months are expected to be required to work out these details.

Under the new setup, passenger and cargo traffic divisions will each have authority to create necessary committees and subcommittees. With some exceptions, committees will have not more than five members and subcommittees not more than three.

AAA Forms Brazilian Sales, Service Unit

All American Aviation, Inc., announces formation of a Brazilian sales and service branch known as Aeroperas Aeroamericanas All American, S. A. (AAAA), which will modify aircraft to use pick-up equipment, provide engineering services, and undertake pilot training in Brazil. Financing of Aeroperas will be 81 percent American and 49 percent Brazilian. The company presumably is an outgrowth of a recent trip to Brazil



NEW TWA VACUUM JUG:

Picture shows Walter Y. Brown, assistant superintendent of TWA ground service, with new type beverage jug, designed under his direction, to serve carbonated beverages or thick soup on planes at 28,000 feet or higher. Of stainless steel, the jug maintains constant pressure on the liquid regardless of change in altitude. Brown is electrically welded.

made by Charles Wendt, All American's vice-president and treasurer, and Mrs. Richard C. duPont. Three All American employees, "Wally" Seis, "Bill" Kichay, and Sherwin Willis, already are stationed in Rio de Janeiro, representing the pick-up firm's interest in its Brazilian affiliate.

Modification Job—The first modification job to be undertaken by Aeroperas will be installing pick-up gear in the Junkers JU52 trimotors used by Aeroperas Cruzeiro do Sul, Ltda., Brazilian airline. Cruzeiro plans to operate combination passenger and pick-up planes in what may be the first commercial application of this type service outside the U. S. The line operates over 11,000 miles of routes in Brazil.

Other newly-launched Brazilian aviation enterprises include Lufthansa Aeroperas Transcontinental Brasileira, S. A., which plans a feeder network throughout the republic; Tapes Aeroperas Santos Dumont, S. A., to link southern with northern Brazil; and Lufthansa Aeroperas Paulista, S. A., which will interconnect central Brazilian cities.

Bottlenecks to Get Test Control Units

Chicago, Washington, Atlanta and Seattle to install new experimental approach control equipment in time to speed handling of air traffic.

In a desperate effort to alleviate or at least alleviate critical air traffic bottlenecks at the four major centers of Chicago, Washington, Atlanta and Seattle, airlines and the Civil Aeronautics Administration are setting up experimental approach control equipment to speed handling frequencies at these points. It may be extended to other places later.

The step was decided on at a meeting in Chicago to cope with this winter's approach problems. Fan markers are installed at these points and 113.5 kilocycles will be used as a common voice frequency, on the ground as well as in flight, at the four points specified. Federal Communications Commission has indicated willingness to grant permission for this arrangement on a temporary basis, probably until next May, in a limited number of places.

Test Severe—All air carrier aircraft are equipped to test and receive on this frequency, hereina-

fore assigned to flight only. Its common use, coupled with employment of CAA's fan markers for holding points and fixes, is expected to speed the process of getting the planes on the ground from the various legs of the routes.

A factor in selection of cities where the system is to be tried out was the need for simultaneous range and voice facilities that could be used for military planes not equipped for 113.5 kc.

Seriousness of the problem is evident from CAA's policy of closing traffic control areas to incoming commercial flights, a policy that has been employed increasingly as congestion at major air centers has become more acute.

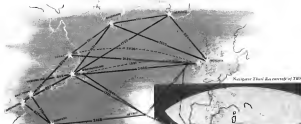
Harvard Port Study To Take Over Year

Examination of management and financing problems main objective of Graduate School of Business Administration investigation.

The study of airport management and financing being made by the Graduate School of Business Administration of Harvard University may require at least a year for completion, early reports indicate. The project was approved last September by an advisory committee of industry and government leaders.

Among its objectives are examination of economic aspects of airport ownership and operation; study of business administrative aspects of airport operation; analysis of airport expenses; inventory control procedures and development of proposals to guide cost allocation charges, including an equitable basis for airline charges; exploration of revenue sources and standards for measuring degree of development of potential revenue; selection and training of management personnel; and to what extent airport ownership and management is a federal, state or municipal function, public utility or a commercial venture, including questions of possible ownership and operation by principal commercial users.

Case Studies Made—The research is starting with case studies of different aspects of various characteristics dealing with history, purposes and various problems. Predictions are that it will be at least six months before any results can be made public, and during most of the year expected



Navigator That Remembers TWA

"used almost exclusively by



on all transoceanic flights"

Ask any navigator, whose calculations have controlled the fate of countless transoceanic flights, how he feels about aerial sextants. Invariably he'll answer that a sextant is more than an instrument of precise measurement. It's something you trust—or don't. It has to do with instinct. Something known only to men who know the skies.

Ed Bolton, chief navigator of the far flag routes of the TWA Transcontinental Division says, "Our navigators use Fairchild Aerial Sextants almost exclusively on all transoceanic flights. They are dependable, rugged, compact, accurate."

And rightfully so. For Fairchild Aerial Sextants were developed from a basic design suggested by the U. S. Army Air

Force to be compact, lightweight, easily handled . . . with a bubble that remains "stable" . . . with automatic recording of consecutive flights during the entire sighting cycle of optical direction.

Fairchild leadership in the design and precision production of aerial operations instruments . . . which include aerial sextants, cameras, radio direction finders, land computing gun sights . . . is the reward of an all-minded policy of engineering and building far beyond the stated basic specifications of any given problem. New York Office 475-10th Avenue, New York 18, Plant 88-95 Van Wyck Boulevard, Jamaica 1, New York.

**AERIAL
SEXTANTS**



**Fairchild CAMERA
AND INSTRUMENT CORPORATION**



HARRIS A-N standard shock mounts are made in two types, steel and dural (non-magnetic) and conform to the joint Army-Navy specifications AN-418 and drawing AN-808.

They have been approved by AAF (Wright Field) and are used extensively by the Army, Navy and aircraft manufacturers.

Made in the full range of load ratings in all standard sizes and types.

Write or write for further details

HARRIS
PRODUCTS COMPANY
CLEVELAND 4, OHIO

to be required, at least four search agents will be needed to assist the man in charge of the case investigations. Lynn L. Bollinger, director of aviation research of the graduate school, launched the study.

Commerce, Interior Join Policy Fight

Support State and Justice Departments in opposing chosen insurance airline for U.S. flag operations.

Departments of Commerce and Interior have joined State and Justice in opposing establishment of a chosen insurance airline for U.S. flag operations in international air transport.

Commerce expressed its views in a report to Chairman Joseph R. Bailey of the Senate Commerce Committee. The interior protest was filed as a brief in the Civil Aeronautics Board's Latin American case.

Commerce Department's report, embodying its views on the McCarran bill for creation of an "All American Flag Line," maintained that "an aggressive and progressive" U. S. international aviation policy requires that "more than one group of American managerial and technical talent be permitted to operate independently in the international air transport field."

James M. McHugh, U.S. report pointed out that necessity was inconsistent with American economic tradition, and recommended that international air transport be placed in the hands of a limited number of companies regulated by CAB, and non-competitive among themselves over parallel routes except where traffic warranted.

Strong competition, it held, is not an effective stimulus to technical and service improvements, nor does it assure simultaneous development of new transport aircraft by a number of U. S. manufacturers. To guarantee the fullest development of our international air transport, several American carriers are required.

In fact, the report stated, "the subnormality of foreign airline monopolies, whether government-owned or privately-owned and closely controlled by the government, are not such as to encourage this country to emulate that form of organization."

Caribbean Problem—The Department of the Interior, in its role as

administrator of Puerto Rico and the Virgin Islands, urged the Civil Aeronautics Board, in its consideration of the Latin American case, to improve the economic position of the Caribbean possessions by authorizing increased air service, preferably to be performed by more than one carrier, whose need for more than daily flights existed. Carriers who serve Puerto Rico only as a link in a larger route system cannot meet the island's requirements, the brief stated. The problem of inter- and intra-island service should be met by a carrier whose main center of operations is in the islands, rather than on the mainland.

The brief asked that local service be certificated immediately, inasmuch as such service would be purely domestic.

Sees Plane Devices Cutting Runways

Lockheed's Chief Engineer Hibbard said Hollywood conference how served, which and other advances may reduce size of field and length of runway.

The largest trans-oceanic airliner now contemplated will have no need for airport runways longer than 5,750 feet, a widely-known aviation engineer told the California Aviation conference in Hollywood in a preview of plane and port possibilities.

Observations and predictions made by H. L. Hibbard, Lockheed Aircraft Corp. vice-president and chief engineer, were particularly timely in view of Civil Aeronautics Administration's recent recommendation to Congress of a huge airport program. CAA officials are known to be wondering how extensively each airport project should be developed in view of recent plane devices, notably landing gear that permits crosswind landings.

Single Runway Ports—Hibbard warned airport planners against needless airport investments, and urged consideration of the possibility that in the near future single runway airports may become wholly adequate. Tests have shown, he said, that the O. F. Maclean patent landing gear (British), which rotates the axis of wheels to permit side crosswind landings, is practical for airliner use.

As a guide for cities planning airports, Hibbard gave the runway lengths he believes should be

"maximum" at sea level for specific types of airline usage. These were 4,500 feet for a feeder airport for twin-engine aircraft such as Lockheed's Saturn, 4,850 feet for a domestic airport for airlines using four-engine transports of the Constellation type, and 5,750 feet for a trans-ocean airport for 300,000 pound airliners. He explained that his estimates were based on airliners meeting all Civil Air Regulation requirements.

Reversible Pitch Prop Factors—Declaring that he saw as likelihood that the runway lengths he specified over will have to be extended, Hibbard said factors favoring airliner operations in those limits, despite contemplated increases in airplane size and loads, are the reversible pitch propeller "which will be standard equipment on all airliners in the future," takeoff assisting devices, and radical development in high-lift wings.

He predicted that future wings using new boundary layer control methods will pass "three times the lift of any wing we have today. He was positive in his prediction of transport aircraft that will operate at speeds exceeding 450 mph with jet propulsion, and insisted that the airport lengths he cited will be "perfectly satisfactory for the jet planes of the future."

While Hibbard is convinced that the helicopter will be the personal aircraft of the future, and predicts a five-passenger helicopter with a 550 mph cruising speed, he believes its development is 10 to 15 years distant. In the meantime, he suggests cities press their development of airports and landing strips for the personal planes that will be in use.

Huge Secret Port In Canada Completed

Newly all the secret last North America's largest airport, a four-mile-square field operated by the U. S. Army Air Force outside of Edmonton, Alta., used partly for long-range aircraft flying to Russia.

After more than a year, the airfield was completed by the Army and went into operation at the end of November. It is to be turned over to Canada after the war. A newsworthy Largest Planes—The airport is 10 miles from Edmonton and can accommodate the largest aircraft being built or contemplated, Army officials say. Two

**50 Caliber
Browning Anti-Aircraft
Machine Gun**

**Today, LEA
Helps to Finish
These Guns**

... tomorrow, as yesterday, it will be hundreds of useful articles of commerce.

One of the most important jobs of the war effort being done by LEA Technicians has been to help devise methods and compositions for the burning and finishing of a large number of the several hundred parts that make up the Browning 50 Caliber Anti-Aircraft Machine Gun. The precision required in the finishing of these parts calls for the best in methods and compositions.

Ability to help the manufacturers of these guns with their finishing problems... including burning, which is also a finishing operation... was made possible by the experience gained through the years of service our technical advisers have given industry on all kinds of finishing problems.

This same talent, working with the most subtle of some of the different grades of finishing compositions, is available to any manufacturer, regardless of the nature of his product or its destination, who is not satisfied with (1) the efficiency of his present finishing method (2) the cost (3) the quality of finish.

These in charge of service stations where plane parts must be recommended will find LEA Service and Compositions very helpful. Write us:

THE LEA MANUFACTURING CO.
WATERSBURY 86, CONN.
Boring, Polishing and Polishing... Manufacturers and Specialists in the Development of
Production Methods and Compositions



Cools the HOT SPOT

We've engineered and built thousands of different H.P. Motor motors for operating cooling fans for hot spots such as radio tubes and transistors in many types of aircraft and radio installations. Complete engineering and precise manufacturing facilities assure volume production of small motors designed to your exact performance specifications. For any job this requires compact, long, dependable power. Tell us your requirements.

Small Motors, Inc.

1214 HESTON AVE., CHICAGO 22, ILLINOIS

Design • Engineering • Production



DARNELL CASTERS

Precision-made Darnell Casters with the DOUBLE BALL-BEARING S/WHEEL assure a long life of efficient, economical service

DARNELL CORP. LTD.
LONG BEACH • CALIFORNIA
60 WALKER ST. NEW YORK 13 N.Y.
35 N. CLINTON CHICAGO 3, ILL.

airways are 7,000 feet long, and the port has nothing higher than farmers' barns on its 10 mile approaches. Costing \$77,000,000, it was paid for by the Canadian government in just seven days and when by Canada took over for \$77,000,000 all airports and landing strips built by the U.S. in the Dominion

Marketing Stressed By Aviation Speakers

More of Brundt discusses post-war manufacturing of air transportation. Curtis-Wright's Personnel director marketing research procedure.

Marketing problems and their solution, discussion topics for any commercial enterprise, are receiving mounting emphasis by air transport and aircraft manufacturing industries.

Recent emphasis of this attention are speeches by two men before the recent American Marketing Association meeting in Chicago. Henry B. Moore, director of research for Brundt Airways, discussed the post-war marketing of air transportation. Alan Posen, of Curtis-Wright's Business Research Department at Buffalo, talked about the place of market research in the design and sale of transport aircraft.

► **Urges Rate Cuts**—Moore finds it not surprising, in view of his express rates, that cargo now goes by air mostly for only three reasons: emergency delivery; maintenance of supplies inventories, especially of products of high unit value, and wider markets for perishables. "Cargo rates," he says, "must be reduced to a point somewhat below anything which, to my knowledge, is being seriously considered, if there is to be any major increase in volume of cargo handled by air."

He is willing, "several hundred thousand potential customers," familiarized with air transportation by the war, will be to buy each transportation depends on the type of product, and here Moore says speed alone will not sell air transportation to the mass market, especially when slow surface transportation constrains.

But whether air transportation is developed by the airlines as a mass air or a luxury service, the expert feels, may be a basic factor in determining who will be able to buy air transportation. Probably it will be both. Fares are another factor, but he doubts that

they will be under 4 cents a mile for domestic air travel in the immediate post-war period.

► **Travel Expenditures Factor**—While there hasn't been much research to find out what minimum income level makes a regular air traveler, economists it is known that travel expenditures are a fairly constant percentage of the gross national product. There have been predictions that of a gross national product in 1948 of \$195 billion, 2.5 percent, or \$4.9 billion will go for travel. Distribution of this sum among the different methods of transportation is a question the air transport industry must answer, Moore believes, if it is to know the size of its post-war market.

Posen described market research as a new field with new influence as an promotional activity among them the increase in recognition of air transport as a routine way of travel; accelerated progress technologically; introduction of improved and more attractive equipment; the possible rapid increase in route extension. The influence of lowered rates effected along with safety and dependability through technological advances he feels is particularly important in an overall market estimate of demand for transport aircraft.

► **Breakdown**—When it comes to breakdown of that demand by type and size, the three primary considerations are traffic volume, schedule frequency, and operation costs. Secondary considerations are consumer preference, airport characteristics and terrain conditions.

Posen favors greater frequency of schedules, in some instances "streetcar frequencies." Advantages of speed, flexibility and quick turnaround, says Posen, are well known to the airlines. There was an increase of 55 percent in overall frequency between 1935 and 1941.

"It would seem that if air transport is to continue to capitalize on its inherent advantages it should maintain or perhaps exceed this established trend of increasing frequency of service."

► **Short-Hand Traffic**—In connection with range of operations, Posen pointed out that most domestic air travel actually is fairly short-haul, below the war averaging about 450 miles per passenger trip. Popular impression, he comments, is that most air travel is long-haul. But in September, 1946, over 48 percent of total passenger miles

flown was in hops of less than 300 miles, and seven of the 16 domestic airlines did not have a single hop over 350 miles long.

From that he concludes that even with allowances for some increase in the average range of post-war operations, a plane that can give best performance on ranges up to 300 or 350 miles will be most suitable for "by far the greater part" of the traffic.

CAL Asks Extension To St. Louis, Chicago

Announcement regulations are in progress for late August aircraft in operation areas.

Continental Air Lines has applied to Civil Aeronautics Board for extensions of AM 60 from Kansas City to St. Louis and Chicago, and announced at the same time that negotiations for four-engine aircraft with which to operate the segments if granted were already in progress. Robert F. Sirs, Continental's president, did not specify the manufacturer or manufacturers of the several million dollars worth of planes his line proposes to acquire.

► **WAL Agreement Possible**—Continental's bid for entry to Chicago drew rise to some speculation in industry circles regarding possibility of a Continental-Western Air Lines interchange agreement, operated at Denver to serve Los Angeles-Chicago link. Some observers pointed out that United Air Lines' bid to extend to Chicago take any further interchanges with Western might easily cause the latter to seek a similar agreement with a non-competitive carrier.

Continental also announced restriction of Lando-Craven, a partner in the New York law firm of Wilkie, Owen, Otis, Farr and Gallagher, as counsel for the line, replacing Percival W. Drachmeyer, who has joined American Airlines. Craven has represented, among others, American Express Airlines and Western Air Lines.

Norseman Control Clarified For CAB

Clearing seasons of Civil Aeronautics Board's New England bearings were marked by success of American Airlines officials that applications of Colonial and Eastern as well as non-operating applicants were designed to divert

Limited Utility

Ralph S. Damon, vice president and general manager of American Airlines, recently told the Detroit Rotary Club:

"The airplane of the future, whether in cargo or passenger service, will be limited in utility previously for reasons of economic soundness and therefore, its cargo will be limited. More than 3/10 of the cargo now carried by surface transportation will still be carried by surface carriers, even when the air transportation system reaches its fullest expression."

New VHF Equipment Is Tested By CAA

Airline pilots and officials are demonstrating at Indianapolis Experimental Station.

A static-free Very High Frequency radio range designed to regulate the course bearing of a plane on an instrument in the cockpit, has been designed by engineers of the Civil Aeronautics Administration's Technical Development Division. The new range equipment has been demonstrated to airline pilots and officials at CAA's Indianapolis Experimental Station, where it is undergoing final testing.

The new VHF range represents a departure from previous range navigational aids in that it emits course signals in all directions instead of the usual beam in low frequency ranges and two on the so-called 3 course aerial VHF range. Like low frequency ranges, the new type is equipped for voice transmissions, but its static-free properties make it much more desirable.

► **Procedure**—The new type range permits a pilot to select a compass



HIGHER AND FASTER WITH FEDDERS

The above photograph shows various types and sizes of Fedders air, vapor and air cooling units.

They are helping America's foremost plane manufacturers deliver the kind of flying performance which is elevating the word "FEDDERS" as a name from throughout the world.

As specialists in heat exchanger equipment since 1874, Fedders has the experience and know-how to design and manufacture radiators for high heat transfer efficiency, light weight and reliability.

FEDDERS MANUFACTURING CO., INC.
BUFFALO 7, N. Y.

A Stimulant for Personal Aviation

THE PERSONAL AIRCRAFT COUNCIL of the Aeronautical Chamber of Commerce, representing the lightplane manufacturers, displays keen sensitivity to a suggestion by the new Administrator of Civil Aeronautics that the industry needs a prod.

In a press statement released Dec. 17 Mr. T. F. Wright expressed the opinion (1) that no government agency at present is providing an "essential stimulus to industry in the development of civil aircraft," (2) that funds should be made available through CAA for the purpose, although no concrete plans yet exist. He noted that the Civil Aeronautics Act charges CAA with "encouraging and fostering the development of civil aviation and air commerce in the United States and abroad. . . ." These points were merely part of a broad outline of possible future civil aviation policy in the immediate post-war period, which also included, additional or improved airports, airways, flight training and education, and suggestions for expanding our commercial aviation business internationally.

The Administrator tried to make it clear that his outline goes beyond merely increasing the pleasure of the flying public and increasing the ability of the plane as a private business vehicle, but also affects our future national welfare. A healthy sport in post-war civil aviation will contribute some business to the aircraft industry, which will need every aid to maintain maximum possible strength, and expanded private flying will build up a constantly available backlog of youth experienced to varying degrees in flying and ground service duties.

IT IS DISAPPOINTING to those who advocate a keenly competitive, aggressive lightplane industry that three days before the release was published, the chairman of the Personal Aircraft Council of the Aeronautical Chamber of Commerce, after reading advance copies, hastily anticipated that some manufacturers would believe CAA "is delving into a phase of the development and manufacture of civil aircraft." He wrote the Administrator that "this may not have been the intention of the release in any way . . . I am sure that you will understand, however, that the manufacturers feel that the development and engineering of aircraft types is their individual responsibility and prerogative and that they believe that good, hard competition in industry is the answer to technological development. They, therefore, would probably jealously desire to retain this activity to themselves individually. It is their understanding that the CAA is an administrative agency and though the CAA generally is much interested in development of improved aircraft types, it is not a procurement agency and therefore its interest is secondary and not operative. One of the best methods of aiding and stimulating design and improvement might be through the careful revision of the airworthiness requirements system."

In his reply, Mr. Wright said the Council had "entirely misinterpreted" the release "which did not in any way intend to influence that we were going into competition with the industry in the development of aircraft. . . . We do hope and had understood that it was your wish that we encourage and foster the development of civil aircraft for private owner use in every way possible and practicable. The exact means have yet to be developed. We had understood that your organization and others had wanted us to establish some sort of personal aircraft department or division in the CAA. Naturally, if such is done it will be expected that such a group take some kind of action or else it would seem inappropriate to include them in the organization." Mr. Wright explained, of course, that it is CAA which holds jurisdiction over airworthiness requirements, and not CAA, although CAA would continue to make recommendations to the Board.

Mr. Wright could also have pointed out to the Manufacturers that a reading of the six year old Civil Aeronautics Act would show that Sec. 366 specifically empowers the Administrator "to undertake or supervise such developmental work and service testing as tends to the creation of improved air navigation facilities, aircraft, aircraft engines, propellers, and appliances," and for such purposes he may also, upon approval of the authority, "make purchases . . . of experimental aircraft, aircraft engines, propellers, appliances, air navigation facilities, and radio apparatus, which seem to offer special advantages to aeronautics." Since the 1938 act was passed, this action has been virtually unopposed, but the new Administrator gives notice that "we sincerely feel that it is our duty to encourage and foster private flying" and that if government can operate as a stimulant or spur to further competition within the industry to develop more economical, cheaper, safer, utility lightplanes it will do so.

The Administrator is one of America's leading aircraft engineers. Until recently he has had the responsibility for coordinating and charting the schedules of the most complicated emergency production program the world has ever seen. He knows, as does the lightplane industry, that the plane now generally considered the most advanced model for the private pilot is five to seven years old, with few other manufacturers even relatively close behind.

WE REMARK that the administrator is right when he tells the personal aircraft council: "all in all, I really feel that the industry is possibly a little over-concerned with the prerogatives and a little too suspicious of activities on the part of CAA which have not been anticipated." We are disappointed in the Council's heavy, ill-considered attitude. It might welcome the chance to match wits with Government. Certainly the buying public is the judge. Give it the widest choice of improvements. The more brains we work the better.

It is imperative that strong leadership responsibilities immediately be started maximum experimentation and development of personal aircraft. If industry does not take this initiative, this appears to be one occasion when Government will furnish the necessary prod. The public and the nation will benefit.

ROBERT H. WOOD

The GENERAL Unitedized TIRE • BRAKE • WHEEL

Stress-Engineered to Give POSTWAR PERSONAL AIRCRAFT

- LIGHTER WEIGHT
- PROVED SAFETY
- FASTER CLIMB
- GREATER CRUISING RANGE

The light characteristics designers must have in Postwar Personal Planes are proved potentials of the General Unitedized Tire-Brake-Wheel. First to pioneer the streamlined aircraft tire . . . General Tire scores another first as a set of Unitedized Wheel assemblies that aid in lowering the pseudo-to-horsepower ratio necessary to perfected flight performance.

Souadly designed throughout to General Tire's Top-Quelity standards, the Unitedized Tire-Brake-Wheel obtains weight reduction with added safety and durability by utilizing these materials stress-engineered to highest, safe load accuracy.

With the Unitedized Wheel Set you get not only the advantages of factory-controlled tire, tube, broken and wheels, as extra, but also the added uniformity of balanced and watched wheel sets including the landing wheels and nose or tail wheel . . . engineered in a unit for balance, lightweight, maximum safety and durability.

Out of General Tire's full-time concentration on developing and producing vitally needed improvements in wartime aircraft has come this Unitedized Wheel, ready now to fit your own plane designs or service present planes. Write or wire for General's Unitedized Tire-Brake-Wheel specification or engineering assistance.

Airplane Division
Dept. 3, THE GENERAL TIRE & RUBBER CO., Akron 9, Ohio

Unitedized Landing and Auxiliary Wheels — In Matched Sets!

The GENERAL AIRPLANE TIRE

KNOWN ROUND THE WORLD FOR QUALITY AND SAFETY



CRUISING SPEED... 5 MILES A MINUTE!

PLANNING ahead for new speed, comfort and efficiency in postwar air travel, United Air Lines has already ordered 50 planes of the type shown in the photo — four-engined DC-4's and DC-6's. The latter are built for a cruising speed of 300 mph., with accommodations for 56 passengers. Their 5-mile-a-minute speed will cut the non-stop Chicago-New York run to 2 hours, 40 minutes, will reduce coast-to-coast flying time to 8¾ hours.

These new super-luxury "Mainliners" and "Cargoliners", delivery of which is expected to start later this year... as well as the other ships of United's great air fleet... will fly lubricated with *Texaco Aircraft Engine Oil* exclusively.

Texaco was chosen by United Air Lines after extensive service experience had

proved its dependability and economy as an aircraft engine lubricant. In joining other aviation leaders in the use of Texaco, United adds emphasis to the fact that —

More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

A Texaco representative will gladly help you select the most suitable fuel and lubricants for your requirements... and furnish suggestions for the improvement of operating and maintenance practices. Texaco Aviation Products are available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, *Aviation Division*, 135 East 42nd Street, New York 17, N. Y.

RECONVERSION RUSTPROOFING

5 Points to Remember

1. Upon termination of war contracts, Government-owned production equipment must be rust-proofed promptly, in accordance with official instructions.
2. Ordnance Specification P.S. 300-4 contains official instructions for the complete processing of such equipment.
3. These instructions require that only rustproofing materials meeting Government specifications be used.
4. Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.
5. For full information, see your Texaco representative or write us.



TEXACO Lubricants and Fuels

FOR THE AVIATION INDUSTRY